THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., SEPTEMBER 11, 1890.

THE WEEK IN IRON CIRCLES.

General Features. Foreign iron markets are just now of considerable interest, in view of pending tariff changes. The Welsh tinplate makers are reported to be in a state of great excitement, as the result of a sudden rush for their product by American consumers, in anticipation of the passage of the McKinley bill. Regarding the general iron market, our correspondents, S. W. Royse & Co., of Manchester, England, write under date of August 30: "An all-around improvement is to be noted in this branch. Prices of pig iron have steadily advanced at Glasgow and Middlesbrough, the total increase during the month being some 3s. 6d. to 4s. per ton, and a continuance of the rise is expected. Stocks in Connal's stores at Middlesbrough have decreased during the month, though shipments are reported to be not so large as in last month or in August last year, but from Glasgow they are satisfactory. In all branches of the finished iron trade more activity is noticeable." Domestic markets generally maintain their *status quo*, as will be seen by the following reports: A moderate amount of business has been booked at Chicago during the past week, several good sized sales of Southern charcoal iron having been made; car load orders, however, continue to be the prominent feature of the market. On certain grades of Southern iron some further cutting of prices has been reported for early deliveries, which is explained by the desire of some furnaces to further reduce stocks on hand. For long scattered deliveries all of the Southern companies are very firm. Silvery irons continue in good demand and the outlook for general Fall trade is good. The Cincinnati market for pig iron has continued fairly active, prices have been well preserved, but in a few instances, where furnaces have accumulated special grades, producers have granted some concessions, either in price or delivery. Confidence has continued to be a prominent feature of the market, entertained by both buyers and sellers. The tonnage on back orders is heavy, but some improvement is noted in making of deliveries previously reported. A better inquiry is experienced for softeners, and there is a moderate but steady movement in charcoal brands. Toward the close of the week some large orders relieved the Southern furnaces of any accumulation which might have taken place and a stronger feeling has resulted. Orders for finished iron continues heavy and the melting of pig metal is almost unprecedented. During the past few days at Buffalo there has been quite a noticeable increase in inquiries from consumers who from actual requirements are forced into the market for their Fall supply of pig iron. As the present acknowledged policy of buyers is to delay purchasing until compelled to do so from necessity there is reason to expect more activity in the future; especially as stocks in the foundry yards are being rapidly reduced. There is little change to note in the pig iron situation at Louisvile since our last report. The market continues quiet, though there is a slight improvement in the amount of iron being sold and inquiries are fair. The majority of furnaces are maintaining a firm front and holding their product at quoted rates and are apparently in a very good position. The course of the Pittsburgh pig iron market during the past two months has been quite a disappointment to furnacemen. Notwithstanding the high prices ruling for labor and for raw material and the advancing prices of many kinds of finished iron, the demand for metal has not equaled the supply, and instead of the expected advance prices have really grown weaker. It is thought, however, that cooler weather will render a larger consumption possible and that the next month or two will make a more favorable showing. For St. Louis we have to report another quiet week, with light inquiry and lighter sales. Whilst some grades are scarcely obtainable, others are pushed to the point of making concessions; and in the same way, some furnaces appear hungry for business, whilst others refuse business at full prices. The wholesale hardware men throughout the country have every reason be satisfied with the present condition of their business. There has scarcely been any such thing as dullness during the Summer, and now that the harvests are over the demand from farmers for all kinds of staple goods is steady and encouraging. The activity is all along the line, and all branches of business seem to be "on the jump."

Iron Ore. No sales can be recorded the past week for the simple reason that no ore is offered for sale. The non-Bessemers are so nearly exhausted that no sales agent would take the risk of selling another pound, and while there is still on hand a very small quantity of Bessemer, the holders are reserving it for their customers rather than offering it indiscriminately, even at the higher figure. The continued complaints of vesselmen as to the delay experience at the ore ports, are daily growing in volume, some of the larger vessels being held from a week to ten days, waiting for a load of ore to bring down. Under the circumstances it is more than likely that suits will be brought for demurrage, and, unless the daily ore output should be immediately trebled, about one-half of the fleet is liable to lay up from a month to six weeks ahead of time. At Lake Erie ports the railways are fast stripping the docks of the ore piles, the furnaces having made room for the storage of their ore supply.

Pig Iron. The market, as a whole, is steady, with occasional flurries now and then, induced by a speculative sale or two. The conditions, however, are so unfavorable to anything like a fictitious movement all along the line, that the price is hardly disturbed by these temporary declines and advances. There is no question but coke is far to high compared with the price of iron. Yet, for all that, the coke makers seem to have a good thing of it, since they are able to place their entire output. Perhaps the shutting down of a furnace or two, that can't stand the combination of high ore and coke prices, will convince the coke pool of the unwise stand it occupies. One significant fact in that direction is found in the accumulation by the Edgar Thomson work, of 75,000 tons of coke, to be used when the works shall get ready to cut loose from the coke combination. Bessemer iron is only fairly active at $18.50, cash at the furnace, and the price is a trifle wobbly. The foundry business is steady, but without any special demand, the price varying from $16.50 to $17 for No. 1, according to the brand. Charcoal furnaces are out of the market, being unable to produce within 25 per cent. of the enormous demands made upon them by the makers of malleable iron. The price of charcoal iron, wherever a little can be bought, is $21 here.

Merchant Iron. All the mills are over crowded with work, and prices are correspondingly on the advance. Bar iron is worth all the way from $1.75 to $1.80 at the mill, but that price really means very little, since many of the manufacturers positively decline all orders for any delivery prior to December 1st. One reason for this rush is found in the driving business done by the car works, but all other consumers are using up all the iron they can get, and all complain of a dearth of raw material. Billets, wire rods, muck bar and all the rest of the list are high, and the price is advancing.

Scrap Iron. Old American rails have taken a sudden jump and are scarce at an enormously high price, $27.50. That, at least, is the figure of the last sale. No. 1 wrought scrap is selling at $22 to $23, and there is considerable business doing in turnings, varying in price from $14 to $16, according to size.

A TARIFF OBJECT-LESSON FROM AUSTRALIA.

The significant thing about the strong article on "Protection versus Free Trade in Australasia," printed in another place in this issue, is that it is written by an Englishman, to the leading English economic magazine, concerning two important English colonies, and is transferred to our columns from an influential English trade journal, the *Iron and Coal Trades Review*. But while it is addressed to the Free Trade public of Great Britain, through a Free Trade journal, it is a most convincing arraignment of the Free Trade policy and an overwhelming argument in favor of Protection. More than this: it deals strictly with facts, from beginning to end, and is devoid of either theory or tirade. It presents a living object-lesson, under practically the same conditions—the inhabitants of Victoria and New South Wales being alike British subjects, with contiguous territory, with a similar language, with the same trade customs, and the same form of government. They are dissimilar in this: that at the beginning of this experiment New South Wales far exceeded Victoria in her enormous area, her vast mineral treasures, her agricultural territory and her commercial advantages; yet the smaller and more insignificant colony has, under a policy of Protection, long since outranked her more formidable rival in everything that pertains to a great and formidable nation. We cannot, perhaps, do better than quote a few striking sentences from the article in question:

"At the present time England stands alone a Free Trader in a ring of Empires and Republics protected by stringent tariffs."

"While the public indebtedness of Protectionist South Australia is only £19,000,000 [$90,640,000] that of Free Trade New South Wales is £77,000,000 [$374,220,000], or four times that amount."

"The total land under tillage in Victoria on the 1st of March, 1888, was 2,576,405 acres, and the total land under tillage in New South Wales, on the 31st of March, 1888, was 1,042,394 acres. While the Victorian farmers are eagerly extending their operations, agriculture is at a very low ebb in New South Wales and is steadily declining year by year. The farmers of New South Wales are crying out for Protection." This hardly looks as if the Protection policy was against the interests of farmers, as some theorists would have us believe.

"The increase in population in Victoria for the six months ending in June, 1888, was nearly double the decrease of population in New South Wales during the same period."

"The little Protectionist colony, with a population of only a million, has machinery and plant worth no less than £31,093,183 [$151,112,869], its manufactures being almost entirely for home consumption; while the estimated value of the plant and machinery employed in 1886 in the 3,694 manufactories of New South Wales was only £5,801,757 [$28,196,539]."

"The total mileage of railways in operation up to September, 1888, in New South Wales, was 2,104 miles, only 66 more miles being in construction, a total mileage of 2,170 miles; while the total mileage in operation in Victoria up to June, 1888, three months earlier, was 2,018 miles, no less than 521 miles being in course of construction, or a total of 2,539 miles, 369 miles more of railways than in New South Wales."

"Wages are higher in Victoria than in New South Wales, and the Victorian working man is incomparably better off than his *confrere* in the Free Trade colony."

"Victoria produces the necessaries of life in the shape of food, clothing, etc., and does not need to import like New South Wales, which imports nearly all it eats and wears."

And, finally, this summing up of it all, which we commend to our Free Trade friends in the United States, together with the entire article, as well worth study and meditation:

"The Protective colony is ahead in agriculture, ahead in viti-
"culture, ahead in growth of population, ahead in railway develop-
"ment, ahead in banking, ahead in large manufactories and the num-
"ber of workmen employed, ahead in enterprise and capital, ahead in
"general prosperity and progress; and, finally, although behind in
"mineral and pastoral wealth, its artisans and peasantry—in a word,
"its entire proletariat—the base and sinew of a country, are perhaps
"the most contented and prosperous in the world."

We note a single exception—the United States of America.

A SHIP-CANAL CONGRESS.

There has just adjourned at Manchester, England, an important conference of delegates from Great Britain and the Continent, called to consider questions relating to inland navigation. The conference in question was the fourth of its kind, the preceding meetings having been held at Brussels, Vienna and Frankfort-on-Maine. This year Manchester was selected on account of the important engineering work which is being carried out in its neighborhood—the canal connecting Liverpool and Manchester. The chief Continental countries were represented either by delegates commissioned by their governments or chosen by the vote of their fellow-workers, but neither America or Canada responded to the invitation to take part in the proceedings, "a matter to be regretted," says *Kuhlow's German Trade Review*, of Berlin, "not only because it prevented the congress from being as representative as it ought to have been, but also because these countries have had special experience in inland navigation, which would have been most instructive."

Sir Michael Hicks-Beach presided. The actual work of the congress was divided into four sections, the first taking the subject of inland canals and canalized rivers; the second, ship canals and tidal river works; the third, the report of the International Statistical Commission; and the fourth, dealing with various matters connected with the cost and management of English and Continental canals. In each of these sections a considerable number of papers was read. As the result of the discussion of these papers, the following propositions were agreed to:

(1) Owing to the low cost of construction and maintenance of waterways, they form a valuable means for transporting large masses at cheap rates, and should be the object of earnest attention on the part of all parties concerned and of the state. (2) In order to secure this, a cheap, thorough-going transport system, with uniform dimensions, is essential. (3) The existence and development together of railways and waterways are desirable: (*a*) because these two means of transport are the complement of each other, and ought to contribute each according to its special merits to the public good; and (*b*) because from a broad point of view the industrial and commercial development which will result from the perfecting of means of communication must, in the end, profit both the railways and the waterways. (4) The great value of waterways to the country at large, and the fact that they are feeders of and supplementary to railways, justifies the state and public bodies in assisting the construction and maintenance of waterways of uniform dimensions, so as to encourage through traffic at low rates.

We commend these results to the gentlemen interested in the proposed Pittsburgh and Lake Erie Ship Canal.

PRESENT STATUS OF THE COLUMBIAN EXPOSITION.

So much rubbish has been sent out from Chicago regarding the Columbian Exposition of 1893 that it is a relief to be able, authentically, to clear up the following points:

The question of location has not yet been settled.

The location of the permanent headquarters has not yet been decided.

The appointment of a director-general has not yet been made.

The one important appointment made is generally recognized as a mistake.

To be more explicit: The lake front site appears to be still a possibility, the Illinois Central Railroad Company having made important concessions. Washington Park is not available, the Park Commissioners having formally declined to allow its use. Jackson Park and the adjacent unimproved lands, 670 acres in all, have been tendered. But the whole question is yet undecided.

As to the director-generalship, we understand, from a gentleman who recently conversed with General A. T. Goshorn, the distinguished Director-General of the Centennial Exhibition, that he is still being pressed to accept a similar position in the Columbian Exposition, but has not yet decided the matter. He is well along in years and enjoys a competency, but from the tone of his conversation it was inferred that he would accept the place providing the inducements were sufficient. We venture the suggestion that $25,000 would be about the figure to allure him, and we desire to add that the commissioners could well afford to pay this—he would save them money in the long run.

The appointment of the Hon. Benjamin Butterworth as Secretary, at a salary of $12,500, is regarded as a mistake all around. In the first place, the position to which he has been appointed is not that of Secretary of the Exposition, as is generally understood, but simply of the local committee. The latter place could be satisfactorily filled at $2,000 per annum, and some one has been guilty of an egregious blunder. It is to be hoped that this is not the beginning of a series of blunders that may seriously injure the whole enterprise.

OUR able contemporary, *The Iron Trade Review*, in commenting on the reported sale of the Temescal tin mines in San Bernardino, says "it is significant that Englishmen themselves should thus recognize the necessity of Protection before a tinplate industry can be built up in this country." We think, too, it is significant, and signifies that as soon as we tax ourselves enough to put a speculative price on tin, Englishmen will graciously avail themselves of the privilege and send the tax to London. That is the was they dispose of the French ship bounties. It is "square business" so long as there is no tariff on

capital or foreign investors, but it is not quite fair toward those who "pay the piper." It would be a desirable thing to have a tin plant at Riverside, but it would be more desirable if the profits should remain in this country.—[Industry, San Francisco.

Exactly. But if we are to rule out foreign capital, what would become of all our great railroad, mining and industrial interests? We may deplore the fact, but the system is itself is not to be blamed for it. On the whole, it results in the greatest good to the greatest number. The San Bernardino case is not typical of all protected industries, but simply shows how Englishmen become Protectionists as they make American investments. "Illustrations," our bright San Francisco contemporary should remember, "should not be made to go on all forms."

The London *Iron and Coal Trades Review* is moved to remark that the McKinley bill "is framed in complete defiance of the wishes and interests of foreign countries," and it hopes to see the measure disappear "in the operation known as 'the slaughter of the innocents.'" Our London contemporary is quite right in regard to the bill—it is framed in the interests of the United States, without regard to the wishes or interests of foreign countries.

PROTECTION VS. FREE TRADE IN AUSTRALASIA.

The following is a summary of a paper by Mr. G. H. D. Gossip, which has recently appeared in the London *Fortnightly Review:*

"Opposite fiscal policies have long been pursued in the two chief Australian colonies of Victoria and New South Wales, which are inhabited by the same race, and whose territory is contiguous. The former had adhered steadily for the last twelve years to a rigorous Protective policy, while the latter has adopted for a very much longer period the policy of Free Trade. It is therefore interesting to compare the progress and prosperity of the two leading colonies of the Antipodes at a time when attention is being more than ever directed to Australia, and to its commercial and political importance, and when the tide of emigration from Great Britain and Germany to the vast Australian continent is constantly on the increase.

"In the case of the two colonies above-named Protection and Free Trade have now been tested side by side as an economic experiment for many years. With her enormous area well-nigh four times as large as that of Victoria; with her vast mineral wealth in gold, silver, coal, iron, copper and tin, her cornfields and immense tracts of pastoral land and timber, with a finer climate, a larger seaboard, and the grandest harbor in the world, the natural resources of New South Wales are almost immeasurably greater than those of Victoria. And yet the little Protectionist colony is ahead of the gigantic Free Trade colony in nearly every respect—a striking confirmation of the evidence of a hundred Chambers of Commerce in favor of Protection. At the present time England stands alone a Free Trader in a ring of Empires and Republics protected by stringent tariffs; but her Australian colonies are now compelled to fall in with the fashion by fencing themselves round with fiscal defences. South Australia, which had previously suffered from great depression of trade and financial embarrassment, has recently followed the example of Victoria, her sister colony, and since her adoption of a Protectionist policy there has been such a marked revival of business and increased prosperity that she has now a surplus of £30,000. While the public indebtedness of South Australia is only £19,000,000, that of Free Trade New South Wales is £77,000,000, or four times that amount.

"There is, perhaps, no surer method of gauging the prosperity of a country than by investigating the condition of its agriculture. The increase in land under cultivation in Victoria in 1888 as contrasted with the previous year, according to the 'Australian Handbook' for 1889, was no less than 446,482 acres, while the increase in land under cultivation in New South Wales was only 67,760 acres. The total land under tillage in Victoria on the 1st of March, 1888, was 2,576,405 acres, and the total land under tillage in New South Wales on the 31st of March, 1888, was 1,042,394 acres.

"While the Victorian farmers are eagerly extending their operations, agriculture is at a very low ebb in New South Wales, and is steadily declining year by year. The farmers of New South Wales are crying out for Protection. Their Free Trade Government under Sir Henry Parkes was indeed forced to a kind of limited Protection in fostering native industry to the extent of granting certain Government contracts to local firms, and in giving a bonus to the ironworkers, in order to propitiate public opinion and allay the clamor against Free Trade.

"The value of buildings, machinery, etc., in Victorian manufactories, with 21,707 horse-power, and employing a far larger number of hands than those of New South Wales, is £12,633,988, and the value of its agricultural machinery is £18,459,195, so that the little Protectionist colony, with a population of only a million, has machinery and plant worth no less than £31,093,183, its manufactures being almost entirely for home consumption, while according to the 'Statesman's Year Book' for last year, the estimated value of the plant and machinery employed in 1886 in the 3,694 manufactories of New South Wales was only £5,801,757.

"The area of Victoria is only 87,884 square miles, or 56,245,760 acres, whereas New South Wales contains an area of no less than 310,938 square miles, or 199,000,320 acres, being about the size of France and Great Britain united. Yet its population, according to the 'Australian Handbook' for 1889, on the 30th June, 1888, was only 1,063,511, while its estimated population in the previous year, in December, 1887, was 1,078,205, thus showing a decrease in population in six months in the Free Trade Colony of 14,694. On the other hand, according to the same reliable authority, the estimated population of the Protectionist colony of Victoria on the 30th of June, 1888, was 1,060,419, while on December 31st, 1887, its estimated population was only 1,036,119, thus showing an increase of population during the same period of six months in the Protectionist colony of 24,300, that is, the increase of population in Victoria for the six months ending in June, 1888, was nearly double the decrease of population in New South Wales during the same period. These statistics are indeed eloquent.

"In order to give some idea of the development of mining in the Free Trade colony, it may be pointed out that up to the end of 1886 the total value of the mineral products of New South Wales was £69,772,187, of which £36,469,138 was gold, £18,352,609 coal, £6,595,102 tin, £4,859,390 copper in ingots, £104,860 ore and regulus, £580,428 silver, and £651,511 silver lead. In 1887 2,922,497 tons of coal, valued at £1,346,440, were also obtained in New South Wales, for New South Wales is the richest of all the Australasian colonies in coal, and its port of Newcastle is the chief coal depot and coaling station of the Antipodes.

"But the superior mineral resources of New South Wales, whose coal area is estimated at 23,950 square miles, and whose cupriferous formations cover 6,713 square miles, prove nothing whatever as to the advantages of Free Trade over Protection, more especially when it is borne in mind that some of the chief mines of New South Wales are worked by syndicates of Victorian capitalists. Only recently a portion of the Australian Steam Navigation Co.'s works in Sydney was purchased by a Melbourne firm, and Victorian capitalists are thus able to invest in New South Wales ventures. Most of the proprietary steamship companies, too, are in Melbourne and Adelaide, the two Protectionist capitals, not in Sydney, the Free Trade centre.

"We now come to the important question of railway development. The total mileage of railways in operation up to September, 1888, in New South Wales was 2,104 miles, only 66 more miles being in construction, a total mileage of only 2,170 miles; while the total mileage of railways in operation in Victoria up to June, 1888, three months earlier, was 2,018 miles, no less than 521 miles more being in course of construction, or a total mileage of 2,539 miles, 369 miles more of railways than in New South Wales.

"It may also be pointed out as a proof of the unsatisfactory financial condition of New South Wales that in the short space of four years, namely, from 1882 to 1886, the interest on the public debt of that colony has actually almost doubled itself. In 1881 it was only £719,753, while in 1886 it was £1,579,179. These figures, moreover, are fully confirmed by the 'Australian Handbook' for 1889, which gives the public debt of New South Wales up to the end of 1887 as £40,955,349. Now the public debt of Victoria up to the end of 1887 was only £33,119,164 or £7,836,185 less than that of the Free Trade colony. Where, it may be asked, is there a colony or country which can show such amazing prosperity and progress as Protectionist Victoria?

"The prospects of a man becoming his own master are better in the Protectionist than in the Free Trade colony. There is no class of people more comfortable and contented than the working men of Victoria. Nearly every artisan has his own freehold, and property has so much increased in value during the last few years that many have sold a portion of their little holding to special advantage, and are still in comfortable and independent circumstances. There are at present 4,000 depositors in the Victorian savings banks of the working classes, where only deposits under £200 are received, and every year the number of depositors and the amount of the deposits are increasing.

"Wages also are higher in Victoria than in New South Wales, and the Victorian working man is incomparably better off than his *confrere* in the Free Trade colony. For, as is well known in Australia, there is great distress in Sydney, where I have often seen mass meetings of thousands of unemployed men, many of whom were unable even to pay for a night's lodging, and had to sleep out on the grass in the domain without any covering. Processions of starving men carrying banners bearing the ominous inscription 'Bread or Work' were often to be seen in the streets of Sydney some two years ago. Free Trade is doomed in Australia. It has been tried in South Australia as well as in New South Wales, and has been found wanting. New South Wales is the only Free Trade colony in Australia; but it is not likely long to continue as such, considering the suicidal nature of its policy; and, in fact, it has already been compelled to resort to certain Protective measures.

"The iron trade of Victoria is in a most prosperous condition. Factories are rapidly multiplying, and she is supplying most her own wants at first cost, and many of those of Free Trade New South Wales as well, plus the freightage. There are also flourishing steel manufactories at Fitzroy, a suburb of Melbourne, as well as nail factories in Melbourne itself.

"The total imports and exports of Victoria for 1877 were £30,373,296, those of New South Wales being only £37,303,153. The total exports of New South Wales for that year amounted to £18,496,917, and the total exports of Victoria for the same year to £11,351,145.

"Victoria produces the necessaries of life in the shape of food, clothing, etc., and does not need to import like New South Wales, which imports nearly all it eats and wears. Victoria, under Protection, is advancing steadily, yet rapidly, along the road to prosperity. On the other hand, industry in New South Wales and Sydney is on the decline owing to Free Trade. What Australia perhaps most needs is not Free Trade with Europe and America, but intercolonial Free Trade between its various States, and Protection against the outside world.

"To sum up. The Protective colony is ahead in agriculture, ahead in viticulture, ahead in growth of population, ahead in railway development, ahead in banking, ahead in large manufactories and in the number of workmen employed, ahead in enterprise and capital, ahead in general prosperity and progress; and, finally, although behind in mineral and pastoral wealth, its artisans and peasantry—in a word, its entire proletariat—the bone and sinew of a country, are perhaps the most contented and prosperous in the world."

LAKE ERIE PORTS: THEIR COAL & IRON ORE HANDLING FACILITIES

IX.—TOLEDO.

On the southwestern shores of Lake Erie its waters sweep inward and southerly, forming Maumee Bay. The shore skirting it upon the south is broken six miles from the lake by the entrance of Maumee River, which at one time was called the Miami—there being two rivers by this name in Ohio necessitated changing the designation of the northern river, the Spanish name Maumee being chosen. The derivation of this name was undoubtedly also the foundation for selecting a companion name in nationality for the young city of the then Northwest Territory—Toledo.

This metropolis of Northwestern Ohio has just cause to be proud of its attainments. Being located mainly upon the west side of the river, about four miles from its mouth, it is at once in position to command inland commercial and maritime attention. Its shipping and dockage facilities are excellent—commodious and of large frontage. The inland country tributary thereto is fertile and productive of all cereals, etc., which need an outlet by rail and lake.

Toledo has attained the well-merited reputation of being "up and doing," and, by reason of activities incident to such a condition, has kept pace, in its commercial successes, with cities of larger opportunities. Its grain trade is of immense proportions, calling to do its bidding the most of the railroads entering its bounds, as well as large fleets of lake carriers, which are augmented by sister crafts in the coal and ore trade. Toledo fosters all the commercial advantages possible by mercantile bodies, such as the Merchants' and Manufacturers' Exchange.

Toledo has water connections by two canal systems to the Ohio river, viz.: the Miami & Erie and the Wabash & Erie canals. Its railroads connect the coal fields of Central and Southern Ohio to a port of lake shipment, and, in turn, afford a ready means of communication in the transporting of ore cargoes from a port of receipt to the furnaces. The railroad connections of Toledo are quite extensive, comprising some thirteen lines, of which number the Columbus, Hocking Valley & Toledo and the Toledo & Ohio Central transact the coal and ore business of this port.

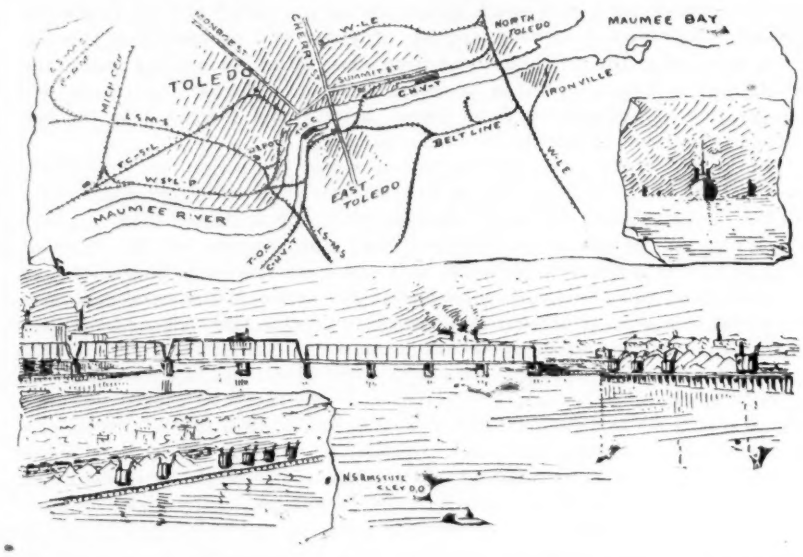
The Ohio Central road has its ore and coal dock in East Toledo, just about opposite Monroe street, where they have a frontage devoted to the ore business of 600 feet by 75 feet wide; the dock at this point is 150 feet wide, but about 75 feet are used for other purposes. This dock is provided with derricks of the rotary type, and it will store 100,000 tons of ore. Their ore receipts for 1889 were 53,000 tons, while the anticipated handlings for 1890 are estimated at 125,000 tons. The dock is in the shape of a projecting arm or pier, extending parallel to the river, and on its inner front facing a slip, 1,400 feet long, which is formed by the shore proper and the dock. This slip is being dredged wider, and the entrance to it made easier by an increased depth of water.

The coal dock is adjacent the ore dock, and fronts on the river. In length, it reaches 1,000 feet, having a daily capacity of 3,500 tons. They use interchangeably in the ore and coal handlings, eight traveling rotary derricks. Their coal shipments for 1889 reached 227,000 tons, and they anticipate handling 325,000 tons this year. The handling plant is worked to its full capacity both day and night, the electric light being used during the night. Their total frontage reaches 1,600 feet, showing for last year a total tonnage of both coal and ore handlings of 280,000 tons, while the expected aggregate tonnage of this year is estimated at 450,000. The docks are under the supervision of Mr. H. B. Wood, who very kindly assisted us to this data.

The docks of the Columbus, Hocking Valley & Toledo Railroad are located upon the west side of the river below the Pennsylvania Railroad depot, and they consist of 750 feet length by 60 feet width devoted to the ore traffic, where 155,000 tons of ore can be stored. They also store ore at Wallbridge, six miles out, the capacity being double that of the dock. With these facilities and 12 derricks devoted to both the coal and ore business, their entire storage capacity reaches upward of 310,000 tons of iron ore. The coal dock is an extension or continuation of the ore dock, and it has 2,000 feet front by 100 feet width, having storage room for 370 cars. Their daily coal handling capacity reaches 4,500 tons, employing six traveling rotary hoists, four swinging boom and two other hoists. These are the same ones referred to as handling the ore. Their coal shipments for 1889 were upward of 423,000 tons, while the ore receipts were about 30,000 tons. Mr. Geo. M. Carleton is the agent of the company in charge of the docks.

The total coal shipments of Toledo for 1889 were 650,000 tons, attained by 3,000 feet frontage, while the total ore receipts were 82,961 tons, with a frontage of 1,350 feet, showing in both branches handling facilities, inclusive, for 20 hatches.

The depth of water adjacent the docks is normally about from 17 to 18 feet. Relative to the improvements of the channel leading to the river, we clip the following from the *Marine Review*, of June 26: "Toledo has just begun to realize within the past two years that her facilities for attracting lake shipping and trade were among the best, and exertions put forth have resulted in four miles of straight channel through Maumee Bay. The present River



and Harbor bill contains an item of $250,000 for the continuance of this work. Monday, Hon. Jacob Romeis, members of the council and other prominent gentlemen accompanied Maj. Blount, United States Engineer, on his trip of inspection. Look at the map of Lake Erie and predict Toledo's future marine greatness, if you can."

We understand that the Wheeling & Lake Erie Railroad contemplate putting up a handling plant for coal and ore at Ironville, on the east bank of the river, about three miles or more below Cherry street bridge. This road, however, operates its coal and ore docks at Huron, O., and possibly any improvements at Ironville may simply be supplemental thereto.

The Toledo ore receipts for the last few years, as given by the 1889 report of the Buffalo Trade of Commerce are, viz.:

1886.	1887.	1888.	1889.
26,950	61,729	75,601	82,961

showing steady increases in the receipts.

Is This True?

It is said that Canadian Bessemer iron ore, equal in quality to Lake Superior ore, could be laid down in Cleveland, O., for $3.90 per ton. The Philadelphia *Record* doubts this story, but adds: "If this be correct, it is folly to pay $6.50 and $7 per ton. The tariff duty of seventy-five cents per ton ought not to exclude the Canadian article."—[Monetary Times.

Mr. T. D. Ledyard, why controls a valuable Canadian Bessemer iron mine, says that the ore can be laid down in Cleveland, duty paid, for $3.90 per ton. American furnace men should bear this fact in mind and investigate the property. The American duty ought not to exclude the Canadian article from the American market.—[Canadian Manufacturer.

The Heaviest Cast Iron Pipe

At their Newport, Ky., works, the Addyston Pipe & Steel Co., of Cincinnati, will this week begin work on casting the largest iron pipe which has ever been attempted in this country. Each pipe will be 12 ft. 4 in. long, 1⅛ in. thick, and 5 ft. in diameter. The weight of each casting will be six tons, or one ton per lineal foot, and the ladles employed in pouring the metal have a capacity of nine tons. The pipe goes to Milwaukee to be used in obtaining a water supply from the lake. Eight hundred length, or 4,800 tons of the pipe, have been ordered.

THE WELSH TIN PLATE INDUSTRY AROUSED.

Latest reports from Wales indicate that the greatest interest, not to say excitement, prevails as to the probable establishment of a tin plate industry in the United States. A Liverpool correspondent of the *Colliery Guardian* says: "There is a great deal of excitement in the tin plate market here this week, there being quite a rush on the part of buyers, who are now anxious to place orders for big lines of both tin plates and terne plates. Enormous quantities of each are being asked for just now, and prices are advancing by leaps and bounds. The latter fact prevents a great deal more business being put through than otherwise would be the case. A fair amount of business, however, has been done this week, and the extent of it may be inferred from the fact that all ordinary sorts of coke, tins and Bessemers obtainable at 14s. 6d. Wales have been cleared off, so that now quotations are 14s. 9d. to 15s. for the regular sizes. The demand for these as well as for the special sizes is very large, and the same may be said of the Siemens steel coke grade of plates, the prices for which are 15s. to 15s. 6d. Terne plates also are in great request, and prices have shot ahead in a wonderfully short time, 28s. being about the lowest at which they are attainable at present, and then they advance in accordance with the grade up to 33s. and 35s. Charcoal tin plates are 15s. 6d to 22s. 6d. Tin is also advancing daily, and is now £97 17s. 6d. to £98 10s. and Scotch pig iron is on the rise, being now 49s. 9½d. to 50s. 3½d. The shipments last week were 11,500 tons, as compared with 8,000 tons during the corresponding week of last year. Middleborough, 46s. 9d. to 47s.; hematites, 57s. 7½d. to 58s. 1½d. per ton."

A South Wales correspondent of the same paper writes: "Makers are much exercised over the American Tariff Bill, and this has found acute expression this week at a conference of leading makers. The upshot of their deliberations was an agreement (more tacit than substantive) to keep up prices to the most practicable figure—pending settlement of this vexed and vital issue in the Senate. At the same time there was a general desire not to take any such overt action as would tend to prejudice the position of transatlantic buyers. It has naturally followed that prices have this week exhibited an advance, and the increase in the price of raw materials has strengthened this tendency."

OHIO'S COAL AND OTHER MINERALS.

The coal trade of Ohio, like that of other States, was in a depressed condition during the year 1889, in the first eight months of that year particularly so. The revival in the iron industry last Fall caused some improvement, and some of the ground lost earlier in the season was regained. This is shown by the fifteenth annual report of Mr. Robert M. Hazeltine, Chief Inspector of Ohio, in which the output of coal of that State is placed at 10,907,385 tons, against 10,910,946 tons in 1888, which latter total represents the largest annual production on record. The falling off in production, it may be stated, was chiefly in the grades of lump and nut coal, the increase in slack almost counterbalancing the decreases in the former sorts. Considering the depression early in the year, the large production shown points unmistakably to an immense production in the Fall months of 1889, and explains the numerous complaints made by shippers of lack of cars on coal carrying roads of that State. The causes for the early depression in the trade are not far to seek, being, of course, the mild Winter and the heavy stocks carried over from 1888 at nearly all points. The shipments from the large lake ports in 1887, 1888 and 1889 compared as follows:

Lake ports	1887.	1888.	1889.	Gain in 1888 over 1887.	Loss in 1889 over 1888.
Buffalo, N. Y.	1,786,167	2,421,874	2,018,204	635,707	403,670
Erie, Pa.	230 845	390,330	327,234	159,485	63,096
Ashtabula, O.	443,942	562,125	557,000	118.183	5,125
Fairport, O.	50,167	138,660	90,342	88,493	48,318
Cleveland, O.	1,546,728	1,855,260	882,557	308,532	972,703
Lorain O.	258,000	287,808	25,500	29,8.8	262,308
Sandusky, O.	152,820	160,040	270,210	7,220	*110,170
Toledo, O.	2,695,710	3,423,785	2,869,382	728,075	554,403
Totals	7,164,379	9,239,882	7,040,429	2,075,593	2,199,453

*Sandusky shows a gain in 1889 of 110,170 tons.

The lake shipments, it will be seen, show little trace of the large production in 1889, the loss, in fact, being over 2,000,000 tons as compared with 1888. The shipments do not even equal those for 1887, in which year the total production was 600,000 tons less. From the first of September to the close of the year, however, it is believed that the quantity of coal mined and shipped was the largest on record in that period. Notwithstanding a loss in production of 187,355 tons from the year 1888, Perry county, O., maintains its lead in the coal-producing counties of the State with a total output of 1,549 459 tons in 1889. There were only four counties in the State in 1889 producing over 1,000,000 tons each, Perry leading, closely followed by Athens and less closely by Jackson and Stark counties.

A detailed report of the 683 mines in operation during the year, shows that while the number of mines worked increased by 22, the average number of weeks worked decreased by 132, as compared with 1888. There were 20,323 coal miners employed during the year, a gain over 1888 of 1,285. The average time worked by these miners was 167 days, a loss of 29 days compared with 1888. In addition to the miners there were employed 2,972 outside employes, a gain over 1888 of 209. The average amount of coal mined was 536 tons, or about 3⅓ tons a day for each miner for every day the mines were in operation. This average would give the mines of the State, when fully operated, a total production of 20,439,211 tons, or nearly twice the actual total production.

Although coal is mined by machinery in seven counties in the State, and it is declared that the number and variety of machines used is steadily increasing, the effect upon the number of ordinary pick miners employed is said to be as yet unimportant. Air and electricity are the motive powers employed. The amount of coal thus mined is placed at 900,000 tons, which it would have taken 1,560 men to have produced under the old method. This would indicate that, other things being equal, the machines have reduced the number of men by 7 per cent., and the average daily output of the miners at work by over 8 per cent. Ohio's production of coal is now over double that mined in 1872. There are 825 mines of all kinds in Ohio, this including coal, fire-clay and iron ore. The inspectors made 2,000 visits during the year. During the year 46 new mines were opened, 26 remained suspended and 28 were worked out or abandoned. The activity of the inspectors is illustrated by the fact that 45 per cent. of the improvements made during the past six years were either ordered made or accomplished in the last two years of that period. Substantial progress in the direction of better ventilation of mines is reported to have been made in the year 1889.

The fire-clay industry is one of great and growing importance in Ohio. The average annual increase in production for four years past is placed at 101,340 tons, and the total production is estimated at 559,129 tons in 1889, an excess over the highest total in previous years of 87.335 tons. The largest beds of fire-clay are located in the eastern part of the State. The increased demand for sewer pipe and building brick is encouraging to the further enlargement of this industry.

Iron ore is mined in twelve counties in the State. In the face of the activity in the iron industry of 1889, the production of the State shows a decline of 943 tons, the total output being 252,409 tons. The falling off appears to have been confined to the sort known as blackband ore, as the production of hematite increased over 10,000 tons. There was a large gain in output of limestone for the manufacture of lime (247,000 tons increase over 1888), but the output for other purposes, such as fluxing, paving and dimension stone, was heavily reduced, as was also the number of men employed. There were 230 accidents of all kinds in the State mines, of which 33 were fatal. The caving in of roofs, falls of coal and injuries from mine cars made up 81 per cent. of the causes of accidents. Whether it is that greater care is exercised, or that the work is less precarious, it is said that there is more coal mined to the life lost or the person injured than in any other State or country reported.—[Bradstreet's.

The Largest Traveling Crane.

The great 110-ton traveling crane recently built by the Morgan Engineering Co, of Alliance, O., has been set up in the Washington Navy Yard, and is now in practical operation. Cranes of other types have been constructed with a greater hoisting capacity than this one, but it is the largest traveling crane in the world. Though nominally of 110 gross tons capacity, everything has been calculated for a load of 150 net tons. The crane spans a space of more than 59 ft., and the tops of the girders, upon which the rails over which it travels are placed, are 40 ft above the floor. The maximum lateral travel of the crane carriage is somewhat more than 44 ft., and the longitudinal travel of the crane is about 200 ft. The total weight of the crane complete is about 200 tons. For the purpose of testing the ponderous machine to the full capacity agreed upon in the contract for its construction, 110 tons of pig iron were piled upon a platform of immense logs or beams, securely fastened together with the largest chains in use at the ordnance shops. To form this enormous weight it requires a solid mass of pig iron piled up about 10 ft. high and nearly 10 ft. square at the base. This tremendous weight was picked up and carried about the shop in all directions as though it were a toy, being raised or lowered, or the direction changed by a simple system of levers requiring but little skill in their manipulation. The whole machine rolls along from one end of the building to the other, its enormous size, easy action, and strength dwarfing all other machines about it. An idea of its immense proportions may be inferred from the fact that the main sheave or pulley block which hangs below it, weighs 5 tons.—[Railway Review.

Canada's Copper and Nickel Mines.

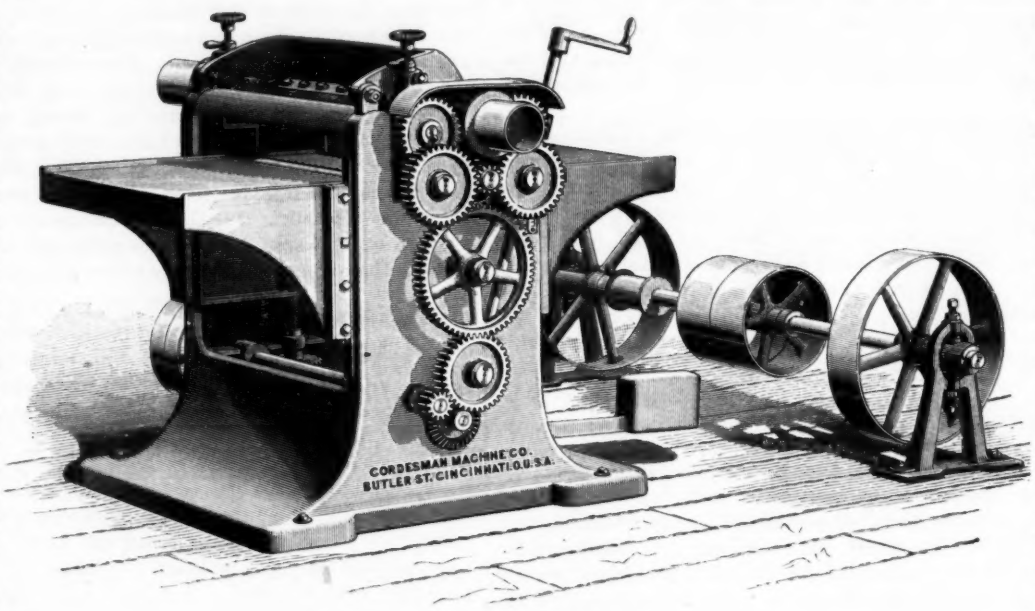
The production of copper and nickel ore from the mines of the Canadian Copper Co., at Sudbury, Ont., for last year, is officially stated to have been 60,000 tons. No. 1 furnace was blown in for the first time on December 24, 1888, and ran from that time to December 31, 1889, 259 days of twenty-four hours, using 31,268 tons of ore, and producing therefrom 3,849 tons of matte, averaging, probably, about 18 per cent. copper and 13 per cent. nickel. In this operation there were consumed 3,950 tons of Connellsville coke, costing about $6.50 per ton at Sudbury. Smelter No. 2 started September 4, 1889, and ran 73 days from that period to December 31st, using 9,740 tons of ore, and producing 1,210 tons of matte, averaging, probably, about the same per cent. copper and nickel as No. 1. This furnace consumed 1,169 tons of coke. Shipments have been made to Philadelphia, New York, Swansea, Liverpool and Hamburg. Coke is shipped by boat from Cleveland to Algoma mills, and thence over the Canadian Pacific Railway to Sudbury. The shaft at Copper Cliff Mine is sunk at an angle of 45°. On December 31, 1889, it had reached a depth of 502 feet, and the width of the ore deposit at that depth was 65 feet; the present depth (on slope) is about 458 feet; about 300 men are employed.—[Canadian Manufacturer.

CHAMBERLAIN, WHEELER & CO, Columbus, O., have been appointed sale agents for the sale of the Fort Payne Furnace Co.'s product. This furnace has a capacity of seventy-five to one hundred tons per day, and will make a specialty of foundry iron. They manufacture their coke from one of the finest Alabama coals, and are so located that they will make their iron from a mixture of 75 per cent. brown hematite and 25 per cent. of limestone fossiliferous ores.

THE number of locomotives in the United States on June 30, 1889, is stated by the Interstate Commerce Commissioners' statistician at 29,036, and the total number of cars of all kinds at 1,097,591; while Poor's Manual, summarizing the figures up to the end of the last fiscal year, of the various railway companies, gives the number of locomotives at 31,062, and the total number of "revenue cars" as 1,090,813.

NO. 3 DOUBLE BELTED PLANER.

The necessity for a perfect surfacing machine at a moderate cost has induced the manufacturers to design the machine, herewith illustrated, and having introduced many new and advantageous features and improvements they confidently recommend this machine to those who desire extra smooth and finished work. The frame is strong, heavy and sufficiently ribbed, the base broad and well spread, giving it a firm and substantial floor support. The bed possessing the same proportional strength and weight is fitted to the frame by means of four bearings, each 14 in. long, provided with adjustable dove-tailed gibs for taking up wear, so located that it insures a perfect steadiness, and allows the heaviest cuts to be taken without the least chatter or vibration. It is raised and lowered by means of a hand wheel in convenient reach of operator. An index on side readily determines the various thicknesses to be planed The cylinder with journals is forged of genuine machinery steel, especially adapted for that purpose, and is accurately turned and balanced and driven by two belts. Two adjustable pressure bars (one on each side of cylinder) yield to the inequalities of the lumber, and being very close to the knives, enables pieces six inches or less in length to be planed with perfect accuracy. The feed works are of simple construction, and may be instantly stopped or started. The two upper feed rolls are make of forged steel and are of large diameter. These rolls are driven with our patent compound yielding gear, and they will permit the rollers to rise to such an extent as to take ½ or ¾-inch cut without becoming disconnected. The front feed roll is given pressure by a weighted lever while the out-feeding roll has a spring tension controllable by hand wheel convenient to operator. The two lower adjustable feed rolls are also of large diameter, and the adjustments of same are perfect. The feed gear is independent, and so arranged as not to interfere with cylinder pulley, and will give a strong and steady feed. The countershaft is 1⅞ diameter and has three hangers being especially desigued for this machine. They are provided with adjustable boxes for taking up wear and lined with genuine metal, so they are amply strong and stiff to withstand the strain and jar of the belts. The tight and loose pulleys on countershaft are 12x6½ in. face and should make 1,050 revolutions per minute. For prices on this machine, and cuts and prices on other wood-working machinery, address Cordesman Machine Co., Butler Street, Cincinnati, Ohio.



NO. 3 DOUBLE BELTED PLANER.

AMERICAN INSTITUTE OF MINING ENGINEERS.

The fifty-seventh meeting of the Institute will be held in the city of New York, beginning Monday afternoon, September 29th, 1890, at two o'clock.

All sessions will be held in Chickering Hall, 130 Fifth avenue. Hotel headquarters will be at the Park Avenue Hotel, 482 Fourth avenue, where the Institute will also maintain during the month of October a postoffice and bureau of information for members and guests. Special rates at the Park Avenue Hotel, $3.50 per day. Applications for rooms and all other communications concerning the New York meeting (except such as relate to papers) should be addressed to James F. Lewis, chairman of the New York Local Committee, 23 Park Place, New York. The following programme is announced:

Sessions of the Institute for the reading and discussion of papers on Monday afternoon and evening and Thursday morning, afternoon and evening.

On Wednesday, Thursday and Friday mornings the sessions of the British Iron and Steel Institute will take place.

On Wednesday afternoon there will be an excursion of the two societies and invited guests upon the Hudson river. (Lunch on board the steamer.)

On Thursday afternoon the Holley Memorial will be unveiled in Washington Square. The commemorative address will be delivered in Chickering Hall, previous to the open-air ceremony, by Mr. James Dredge, editor of London *Engineering*.

On Saturday members and guests will proceed by special train to Philadelphia; on Tuesday, October 7th, to Lebanon and Harrisburg, and on Wednesday to Johnstown and Altoona, arriving Wednesday evening at Pittsburgh, according to the programme of the General Reception Committee.

At Pittsburgh, two joint international sessions will be held, by the two societies and their guests, for the reading of papers. Further announcement will be made hereafter concerning these sessions, and special programmes will be issued by the local committees of Philadelphia, Pittsburgh and the principal points to be visited in the subsequent general excursions.

The general excursion will proceed from Pittsburgh to Chicago, and at the close of the visit to Chicago will divide in two parties, going respectively north and south. According to the programme of the general reception committee, the northern excursion will visit the Menominee, Gogebic and Marquette iron ranges and the Lake Superior copper district, returning to New York via the Sault Ste. Marie Canal, the Sudbury (Canada) nickel and copper mines and Niagara; while the southern excursion will go from Chicago to Birmingham, Shelby and Anniston, Ala., returning to New York via Chattanooga, Tenn., Middlesborough, Roanoke, Cripple Creek iron mines and Pocahontas coal mines, Luray, Va., and Washington. Both excursions will reach New York about October 28th. All communications concerning the excursions should be addressed to Mr. Charles Kirchoff, Jr., secretary of that committee. Railway transportation and sleeping car accommodations will be furnished by the general committee to the members of the Iron and Steel Institute and other invited guests from abroad. Members of this Institude (and others, in the discretion of the general committee), to the extent of practicable accommodation, may obtain tickets entitling them to participate in the excursions and entertainments *en route* at the following rates, which cover railway fares and Pullman berths only, viz:

New York to Pittsburgh and return, $20; New York to Pittsburgh and Chicago and return, $30; New York to Pittsburgh, Chicago, and over the northern or the southern excursion route and return to New York, $60; Philadelphia or Pittsburgh over either route and return to starting point, $60.—[Engineering and Mining Journal.

Iron Direct from the Ore.

In all likelihood the end of the year, or early Spring, will see the erection of an extensive plant for the manufacture of iron by the direct process. A number of iron men have been laying their heads together with this end in view for some time past, and the prospect is at present pretty well advanced. For obvious reasons neither the names of the promoters or the proposed locality can yet be given. The plant will not be erected in Pittsburgh, but in the neigborhood of one of the best gas fields in the vicinity. As stated, the operations of the company will be directed to the production of iron by the direct process. This process is now in use in but one works here, viz.: the Carbon Iron Co.'s plant at Thirty-second street. The firm controls the patents under which the iron, by the process, is manufactured. It is claimed for it that though the results of the method have been very satisfactory, that there is still room for improvement, and very considerable further saving in the cost of making iron.

By the direct process, the charge, including the ore and coke, is first ground down to powder and charged into a furnace under somewhat similar conditions to a regular puddling furnace. It is then allowed to melt and does not require to be worked. When it has melted to the requisite point it is rolled into a ball and passed through the squeezer. Thus the iron is made up to a point by this process in one operation that it requires two to perform by the regular method.

Mr. D. B. Grey, of the Quaker City, who was in town yesterday, had something to say at leaving, about a new method for extracting iron. He said: "There is on exhibition in Philadelphia a very interesting piece of machinery —electro-machinery it might be called—for the extraction of the iron from sea sand, to be found on any beach in the world. It may not be generally known that the sea sand just mentioned contains from 5 to 7 per cent. of iron, enough, it is said, to give a large excess over cost of extraction. The machine belongs to 'The Rotary Magnetic Separating Co.,' who hail from Chicago, Mr. Tenney, the inventor, being on hand to explain and show the working of the machine. It consists of a cylinder, whose surface is composed of electro-magnets, revolving on the inside of an endless canvas belt. The sand is fed to the belt, and a spray of water separates the particles, the iron being retained by the powerful electro-magnets and carried off on the belt to a receptacle at the other end, while the sand falls into the trough below."—[Pittsburgh Dispatch.

The Fuel Question on the Pacific Coast.

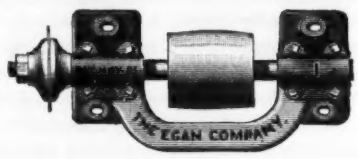
If the coal around Puget Sound can be got here at a fair cost for mining and transporting, as in other parts of the world, San Francisco should become a city of cheap fuel. With the same facilities for handling that exist on the German Ocean, coal should be no dearer here than in Cleveland, Chicago, or St. Louis. It is said that at Mount St. Helen, Washington, there are 40,000 acres of coal deposit, this far untouched. In the Carbon region there is one vein 24 feet thick, and several 8 feet thick, of pure coal, covering three whole townships. In Skagit county there are vast areas of coal 6 feet thick, and the veins extend to Vancouver Island. These statements we take from *Engineering*, and if correct there will be no lack of coal on this coast in future, when there is competition in mining and carrying it.—[Industry, San Francisco.

Modern Light and Heat states that since the first introduction of electric motors into the ventilating service there has been no let up to the demand, but the high temperatures of the present Summer have created a literal boom in the business, and the little hustlers have been set a humming by the thousand. They have been productive of more equanamity of temperature, personal comfort, and the lessened use of strong adjectives than all Summer medicines and cooling drinks put together.

NEW IMPROVED SAW MANDRELS.

Every wood-worker knows of the utility of the saw mandrel, but a few only know of the advantage and convenience in using the one just placed on the market by the well-known firm mentioned below. Something new in this line has been originated to afford operators opportunity to get that which will serve their purposes best, and a saw mandrel or arbor which has improvements in it is of importance and of timely interest.

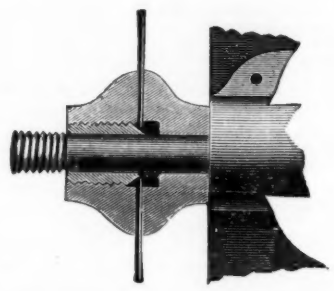
We present cuts of the new patent saw mandrels, showing devices and adjustments possessed by none other in the market. The saw arbor has been,



to some extent, neglected among machinists and builders of machinery, parties claiming any iron shaft good enough for a saw mandrel.

The builders think the saw arbor one of the most important of any machine in a shop, and therefore make a special effort to show up the fine points of their latest idea in this direction. They have just had patented a patent expansion contrivance for making a saw run perfect on the mandrel. The hole in the saw may vary ½ inch, and yet will fit, and no spring or crowding on center takes place.

The main points on the mandrels are: A good stiff iron frame; very long boxes lined with genuine babbitt metal; a first-class steel mandrel without seams or flaws; a patent self-oiling box of improved make; the mandrels are made and fitted by mechanics and are balanced perfectly in the most thorough manner. The pulley can be in center between boxes, or on the outside, if preferred. They specially recommend them for rip and cross-cut saws, where

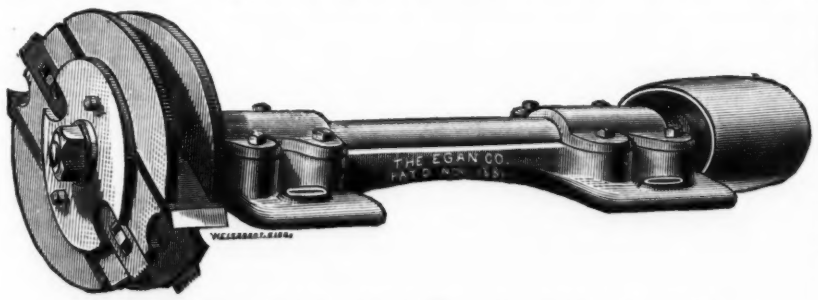


SECTION SHOWING EXPANSION DEVICE.

strength and exactness are required, and for agricultural, wagon and carriage factories, planing mills, pattern shops, packing rooms, etc., they are unequaled and the smaller sizes for doing the very finest and smoothest work are superior to all. Various sizes are made.

Parties needing a combined saw arbor and boring attachment can have boring attachment fitted on opposite end from saw. Nos. 1, 2, 3 and 4 are best suited for this purpose.

Patent adjustable dado heads to be used on saw mandrels are very perfect. They are of best steel, and they make three sizes, so as to take in any width of cut wanted. Changing the bit expands the head to any size wanted, according



PATENT SAW MANDREL WITH EXPANSION STEEL DADO HEAD.

to the bits. The heads are fitted up in the most perfect manner; and besides the styles shown, they can make any special heads, adapted to any purpose, and will furnish ideas for them, or work to drawings.

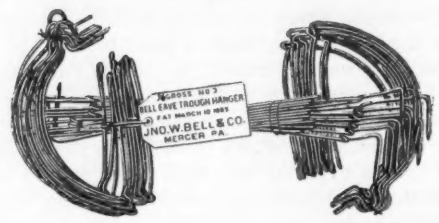
For further information, address the manufacturers, the Egan Co., Nos. 251 to 271 West Front street, Cincinnati, O.

A "Child-Catcher."

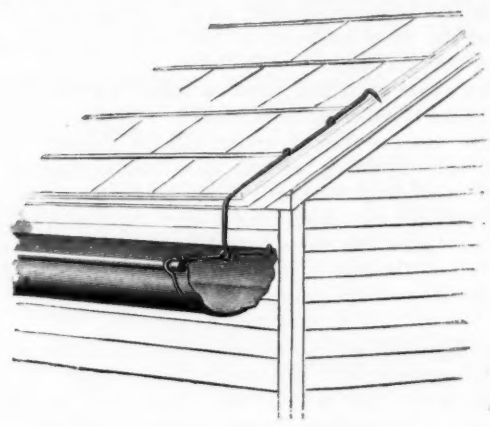
The Citizens Traction Co., of Pittsburgh, Pa., are now testing a safety device for their cable cars, to take the place of the usual cow-catcher used on such cars, that might justly be called a "child-catcher." It is attached to the front of the car by a hinge and extending downward and forward by a sharp curve till it reaches a point about six inches from the track and a foot in front of the car, and then extends forward nearly on a line with the track for nearly three feet, the front end being about four inches from the track. It is held in its place by a suitable spring, and a lever which extends up into the car within the reach of the gripman is so attached that by a pressure of his foot the front end of the "catcher" is depressed enough to touch the ground, so that if a child, or, in fact, any other obstruction was on the track the "child-catcher" will slip under it and it would be carried on the large shovel-shaped affair, in safety till the car could be stopped, instead of rolling it under the wheels, as is the case in nearly every instance with the ordinary cowcatcher in use. This "child-catcher" is constructed of ordinary gas pipe, bent to the proper shape, except that across the front a piece of three-quarter-inch wire cable is drawn with just enough slack so that when it is pressed down to the track it will fit the oval shape of the pavement between the tracks. While, fortunately, there has been no opportunity to test it practically, there is little doubt that it will prove a great safeguard in an emergency. It is the invention of a Mr. Snee, of Pittsburgh.

THE BELL EAVE TROUGH HANGER.

The bell eave trough hanger is made from a single piece of heavy wire, galvanized, and will neither corrode nor cause the trough to rust. It is so formed as to fit the trough, and can be put on and fastened by simply closing down the hook. This done, it forms a complete brace or support to the trough



and renders inside bracing unnecessary. When the trough is elevated to its place the roof-piece of the hanger can be bent and adjusted to pitch of roof, and so as to give it proper fall, and all can be done so easily and quickly that much time and a great deal of labor, it is said, can be saved by their use, besides making a strong and durable job. They are put up, two dozen in a package. The hanger has been in use for some time and is sold chiefly through jobbers. It is said to be greatly in favor with tinners, and its sale, it is claimed, is rapidly



increasing; those for 1890 being largely in excess of those of any former year. The hanger is made in nine sizes, to fit troughs from 3½ to 7 inches wide. A sample hanger will be sent free, together with price lists and a list of jobbers who sell it in different parts of the country. Manufactured by John W. Bell & Co., Mercer, Pa.

The Queen Pays all Expenses.

The *Queen's* last "Free Trip to Europe" having excited such universal interest, the publishers of that popular magazine offer another *and* $200 *extra for expenses* to the person sending them the largest list of English words constructed from letters contained in the three words "British North America." Additional prizes consisting of silver tea sets, china dinner sets, gold watches, French music boxes, portiere curtains, silk dresses, mantel clocks and many other useful and valuable articles will also be awarded in order of merit. A special prize of a sealskin jacket to the lady, and a handsome Shetland pony to girl or boy (delivered free in Canada or United States) sending the largest lists. Everyone sending a list of not less than twenty words will receive a present. Send six U. S. 2c. stamps for complete rules, illustrated catalogue of prizes and sample number of the *Queen*. Address the *Canadian Queen*, Toronto, Canada.

CALIFORNIA topics occupy considerable space in the September *Century*. The paper by John Muir on "The Treasures of the Yosemite Valley," in the August number, is followed by another on "Features of the Proposed Yosemite National Park," which is beautifully illustrated. In "Topics of the Time," is an editorial in the same strain on "Amateur Management of Yosemite Scenery." The number also contains, apropos of the celebration on September 8th of the fortieth anniversary of the admission of the State, a paper by George Hamlin Fitch, entitled "How California Came into the Union." This paper is a forerunner of the series on the Gold Hunters, and in the present number the *Century* begins a temporary department of "Californiana" similar to the "Memoranda on the Civil War," and to be devoted to short articles on topics of special interest relating to the '49ers. This month these articles are "Light on the Seizure of California," by Professor Royce, of Harvard; "The California Boundary Question," by Francis J. Lippitt, Esq., and "The Date of the Discovery of the Yosemite," by Dr. Bunnell, of the Party of Discovery. Of course all other departments are well sustained.

DEPRESSION prevails in the metallurgical districts of Belgium. Some new business is offering, but at discouraging prices. Girders have been selling of late at £5 10s per ton free on board at Antwerp. The Belgian construction workshops are pretty well employed, but they are principally engaged upon old orders. Contracts for 15,000 tons of rails have been secured in Belgium upon Greek account.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

GOGEBIC RANGE.

An important mining lease has just been received here for record. The Penokee & Gogebic Development Co. leases to the Wisconsin Iron & Steel Co., for the period of twenty years, the west half of southwest quarter of Sec. 16, town 45, range one east, with the usual conditions as to working and payments. The lessor is to have fifty cents per ton royalty on all ore taken out.—[Ashland Press.

MARQUETTE RANGE.

Certainly as singular a sight as is any where visible in this world is at the Winthrop mine in the lower levels, where are stupendous stopes of rich hematite, scores of feet high, left standing untouched by the miner, all owing to an imaginary line running along on surface called a section line, and run by the United States surveyors along back in the "forties" of this century. The Winthrop is on the southwest quarter of section 21 and was opened a few hundred feet south of the north line of the quarter. The ore dips north. This, of course, in sinking, brought it across the line on to the south half of the northeast quarter of section 21, which is owned by the Lake Superior Iron Co. This condition of things explains why such huge stopes of first-class ore are left unmined. Similar conditions will eventually occur at the Mitchell also.—[Peninsular Record, Ishpeming.

In the mine that is now being developed at the east end of their property, the Pittsburgh & Lake Angeline Co., of this city, has exposed a body of ore which is the purest and best we know of in this mining region, and there is no other mining region which can compare to this. Samples taken every few inches in a drift of 43 feet in length gives by analyses: Metallic iron, 60.20; phosphorus, .007. These samples were not selected with a view of favoring the mine, but to get an average of the quality of the ore, and were taken in the usual honest way. The ore is a blue hematite, very dry and firm. The mine is one that is a new one, opened up at the east end of Lake Angeline, and distant from the main workings of the Lake Angeline company at least 2,000 feet.—[Iron Ore, Ishpeming.

It is very likely that steps will soon be taken for the unwatering of Lake Angeline. There are three companies more or less interested in this task, and it is probable that some course of action will be decided upon in the near future. Two plans for draining the lake have been suggested. One is to drift through the diorite bluff to the north of the lake. This would require about three years to perfect, and would be a very expensive undertaking. The other, and it would seem the more feasible plan, is to cut a trench from the west end of the lake. The cost of the improvement would mean, it is thought, about $75,000.—[Iron Ore, Ishpeming.

MENOMINEE RANGE.

All of the mining work at the Shafer is now done in the second, or 200-foot level, with the exception of a little scraming in the first. The property never looked better than now. The vein at No. 2 shaft has been cut 130 feet, and but one wall shown, while a distinct vein of Besssemer ore has been opened, giving every reason to believe that with depth the mine will become a Bessemer producer throughout. There was much talk of the Shafer being worked by contract, but there is no truth in it; it is not a mine that can be worked by contract to the benefit of the owners. The ore is soft, and the vein very wide, requiring much skill in operation; the contractor would not observe the care necessary to keep the mine in good shape for future years' work.—[Diamond Drill, Crystal Falls.

The stripping at the new Crystal Falls mine is completed, making an open pit of 100 feet long by 80 wide, and nothing but the cleanest ore in sight. All of the machinery, except a boiler, is on the ground, and so soon as that arrives active mining will be commenced, and as much ore as possible sent out this year. The location is being cleared of timber and the necessary buildings going up. The spur track is well under way, and will be completed, it is expected, by the first of October. The property is fixing to, and is capable of, shipping out a large amount of ore.—[Diamond Drill, Crystal Falls.

The ledge has been uncovered at the Manganate mine, though it will be a week or more before the great stripping is completed. Just over the ledge lays a strata of "hand pan" and small boulders, which was most difficult to remove. All of the dirt from the huge hole occupies ground at the north of the opening, and will form a foundation for a stock dock. Hoisting from both Nos. 1 and 2 shafts at the west end has been going on some time; quite a stockpile has accumulated.—[Diamond Drill, Crystal Falls.

Matters on the Marquette Range:—

If the Marquette Iron Range ever saw better times than now it must have been before the advent of this pencil propeller. A drive, last week, to the Negaunee Hematite and the General Grant, brought sights to the eye, astonishing almost beyond belief. Between the Grant and Eagle Mills, and almost in sight, were eight diamond core drills, at work each on different forties, and all going down either in ore or rich indications. The dense brushwood, which was wet after so much rain, and the low ground intervening between the locations alone prevented a personal visit to each drill, where more minute particulars would have been obtained, and the names of the parties conducting the exploration given, with an exact statement of the depth of each hole and the material bored through. That man was a brave man who first conceived the idea of there being ore at the Negaunee Hematite, and who had the courage to sink for it. Those familiar with mining matters well know that it was the late Jno. Mitchell, a brother of the present Superintendent, Samuel Mitchell, of Negaunee. Of course, after the presence of ore was established at the Negaunee, it was an easy matter to conceive of there being ore bodies east and west of this point. It is on the adjoining forty east that the Grant folks are now sinking a large working shaft, they are already down over fifty feet and will strike the ore at about one hundred feet. Large quantities of water are necessarily met with, the situation being on the edge of a swamp; but little trouble was had getting to the edge, and a huge pump is ready to go down to control the water. Drill holes had previously been put down and the ore cut by them.

The topography and geology of the country here is low-lying, level, swampy ground to the north, with a few knobs diorite shoved up, farther north, and across the railroad track, are quartzite knobs irregularly and promiscuously scattered about, back of which runs large arrears of diorite. The low ground is underlaid with arenaceous schist, under which is quartzite and then ore? meandering through all is the Carp river; south is more or less slate and what Prof. Wadsworth, of the Michigan Mining School, calls jaspilite. These conditions, or very nearly these, hold good for nearly four miles east, and in these four miles will eventually be found large producing iron mines. As great a drawback, and, in fact, the only real dead weight which this range has to carry is the fact that the major part of the land within the iron formation is held by corporations who do nothing themselves, or let others do anything. The ground above described has for years been known to contain ore, but there was no way until lately that one could get a chance at it. Lying all around us on every side is land plethoric in mineral which no one can get at, held in undeveloped idleness and waste, by the corporate owners. We see in the east range of Negaunee what active life would at once develop all over the district could fair and just options easily be obtained. The consolidation of the Iron Cliffs Co. with the Cleveland Iron Co. now foots up nearly 100,000 acres of choice iron land. Is it any wonder that the Gogebic range is forging ahead, while the old, reliable Marquette is falling behind?—[Peninsular Record, Ishpeming.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1890, up to Wednesday, September 3d, are as shown by the appended statement, condensed from the Marquette *Mining Journal*:

MARQUETTE RANGE.

American	202	Grand Rapids	5,245	New York	2,423
Barnum	6,098	Humboldt	14,647	Pitts. & L. Angeline	181,379
Buffalo	60,165	Imperial	16,247	Prince of Wales	18,705
Cambria	50,013	Jackson	79,919	Prout	9 336
Champion	163,052	Lake Superior	206,031	Queen	73,994
Cleveland	166,740	Lillie	24,311	Republic	132,026
Cliffs Shaft	118,732	Lucy	34,993	Republic Reduction Co.	2,559
Detroit	4,058	Marquette Ore Co	1,057	Salisbury	61,601
Dexter	630	Michigamme	43,319	South Buffalo	88,891
East New York	20,481	Milwaukee	21,861	Volunteer	85,180
Fitch	6,049	Negaunee	45.474	Winthrop	60,942

Total, Marquette Range.....1,806,749

MENOMINEE RANGE.

Aragon	17.785	Hamilton	15,040	Paint River	37,146
Armenia	19,274	Iron River	92,529	Perkins	6,059
Chapin	452,362	Ludington	52,133	Pewabic	9,036
Commonwealth	75,100	Mansfield	6,430	Shafer	32,274
Cyclops	41,555	Mastodon	45,913	Sheridan	595
Dunn	90,860	Mastodon South	514	Vulcan	82,364
Florence	134,277	Millie	21,820	Youngstown	29,979
Great Western	53,155	Monitor	11,682		
Half and Half	383	Norway	44,240		

Total, Menominee Range.....1,370,515

GOGEBIC RANGE.

Anvil	21,551	Father Hennepin	9,634	Odsnah	1,066
Ashland	281,980	Federal	8,848	Pabst	77,776
Aurora	154 718	First National	105	Palms	18 156
Brotherton	37,523	Germania	26,154	Ruby	6,572
Cary	45,776	Iron Belt	73,210	Section 33	66,392
Colby	148,139	Montreal	6,630	Superior	18,888
Davis	564	Mt. Hope	40,170	Trezona	31,739
Eureka	18,151	Norrie	562,805	Windsor	19,339

Total, Gogebic Range.....1,649,556

VERMILION RANGE.

Chandler	247,679	Minnesota Iron Co	379,862	Pioneer	5,928

Total, Vermilion Range.....633 469
Grand Totals.....5,460,289
To corresponding date of 1889.....4 633 775

Condition of the Stove Trade.

There is not much doubt but that stove trade at the present time in some directions is not as satisfactory as it should be, and it is equally true that trade with certain establishments and in certain parts of the country is exceedingly good. Altogether the year promises now to be more satisfactory in its results than seemed to be likely a little earlier. It may prove the best of several years past. At the same time various movements are on foot which promise to secure much larger profits to manufacturers for the future, not necessarily by increasing prices, but rather by diminishing expenses, and many of those who are at present discontented are anxiously turning their faces toward their consummation. On the other hand, those who are having a good business at the present time are attending to it with such diligence that some of their fellow manufacturers are tempted to accuse them of neglecting favorable opportunities, for the consideration of consolidations, trusts and various other schemes of co-operation that promise great things for the industry. If the stove trade should show satisfactory balance sheets in many directions the present year, it will, no doubt, facilitate certain pending negotiations, especially if for any cause they should be deferred until the beginning of a new year.—[Metal Worker.

THE Union Pacific Co. is shoveling the snow out of the Alpine tunnel for the purpose of getting out about fifty cars of coal snowed in last Winter. It is not now the intention of the company to keep the route open during the Winter, as there is not, it is claimed, enough business to pay for operating a train, even if it costs nothing for opening snowdrifts and repairing washouts. Some time, it is thought, there will be enough business done in iron and coal to keep the road in a passable condition.

THE section of the large California tree that is to be exhibited at Chicago is 20 feet in diameter, and it wasn't the largest section that could be cut from the tree at that. It is as large as could be transported by rail.

STEEL FOR WATER AND OTHER PIPES.

The article in your issue of August 2nd seems to have been prepared in some misconception of the nature of the question which is now under discussion in engineering articles. So far as I am aware, there is no discussion as to whether cast iron, steel or wrought iron is the best material for pipe manufacture. In the American Water Works Association the debate took a practical turn, and hinged on the question—understood by the speakers if not clearly formulated in words—whether the superior advantages of steel as a material was not offset by the passive resistance to destructive oxidation in the ground of the heavy and clumsy cast iron pipes hitherto used. In the New England Water Works Association, as I learn from a study of their transactions for several years, the discussion has assumed much the same character—cement pipe being contrasted with cast iron, not because it was open to debate whether iron or cement is the better pipe material, but simply which rendered the better service during a long term of years.

I venture the prediction that the days of the cast iron pipe are nearing an end. They represent too much dead weight for too little strength. Wise engineers long ago reached the conclusion that the most costly and least satisfactory way of protecting iron against oxidation is with mere bulk of its own substance; and those most concerned in the future of cast iron pipe, for business reasons realize most keenly the fact that it is destined soon to take its place among the materials forced into disuse by the progress of the arts. Mr. Hamilton Smith, Jr., who stands very high in the profession of hydraulic engineering, in a paper contributed to the British Iron and Steel Institute, and published in Vol. I. of their transactions for 1886, furnished data as to the life and strength of wrought iron and steel pipes for water conveyance, which left little room for further discussion.

The query presents itself: Why should not wrought iron, or still better, steel, be used for conduit pipes in preference to cast iron? If it answers the desired purpose in California, why should it not do so in other parts of the world. To one like myself, who has for years been accustomed to the California practice, it seems as irrational to build a pipe, carrying water under considerable pressure, of cast iron as it would be to build a suspension bridge with the supporting chains made of cast iron.

Experience in the United States has shown that the practicable limit of size for cast iron mains is a diameter of about 4 feet, even when the pressure is less than 100 feet. It is evident that a pipe of wrought iron or mild steel can be made of almost any desired size, and this may be of much advantage if it be desired to conduct a large supply of water through pipes for city or other use. For instance, with an inclination of 3 feet per mile a single pipe 8¼ feet in diameter will carry 280 cubic feet per second, while seven pipes, each 4 feet in diameter, would be required to transport the same quantity of water with the same inclination. The cost of the large pipe, made of steel or wrought iron, would be considerably less than one-half of the cost of the seven small pipes made of cast iron.

The ideal conduit for high pressures is a welded steel tube: such tubes could probably be subjected to a tensile strain of 25,000 pounds with perfect safety, and would be much preferable to riveted pipe, not only on account of superior strength, but also by reason of almost perfect interior smoothness. The adaptation of a superior and cheap metal, such as mild steel, for conduits, will permit the construction of hydraulic works in many parts of the world which now appear to be impracticable, owing to the cost of many of the methods still in use for the transportation of water.—[Jas. C. Boyles, in Engineering Record.

The problem of the protection of steel tubes in the ground is no longer one which causes the engineer any anxiety. A steel tube 1-16 inch thick, properperly coated with asphalt applied in the right way, will, under normal conditions, have a longer, useful life in the ground than a cast iron pipe ¼ inch thick. Meanwhile it will be, what cast iron is not, impervious. The experience in the streets of New York with cast iron gas and water pipes shows how long they will outlive their usefulness as conduits. The pipe of the present and future is the welded steel tube; and the fact that the demand for these has always been greater than the available supply would seem to dispose satisfactorily of the idea that they are regarded with a prejudice which must be overcome before they can be generally introduced.—[American Manufacturer.

Manipulating the Surplus Pig Iron.

It is stated that the improvement in the Glasgow market for Scotch pig iron is owing to American buying, but it is a significant fact that the stocks of unsold pig iron in America are now heavier than they have been in the history of the trade in the States. [A mistake. The stocks of unsold pig iron in the United States on hand June 30, 1890, amounted to 380,744 net tons, against 563,286 net tons on hand June 30, 1889.—*Editor Iron Trade Review.*] The report that an English syndicate is buying Scotch iron warrants is declared to be true, being the result of attempts two years ago to interest American millionaires in the project. Representatives of the iron interests in Glasgow have been in New York some time trying to ferret out the truth of the rumors that American capitalists were disposed to invest heavily in Scotch warrants, and they appear to have sent dispatches confirming the report to Glasgow and Birmingham. It is stated that in June a strong London syndicate made overtures to Wall Street parties to enlist them in a large venture in Scotch pig iron warrants in Glasgow. In fact the idea was to purchase the whole stock there and to operate in American pig iron. It was shown, however, that American pig iron could not be bought in any considerable quantity of desirable brands. The stock of American warrants is 68,000 tons, and the total stock of American in this country is only about 300,000 tons. It is scattered all over the country, and not readily negotiable for loans, because the bankers here are not going to trouble about retaining lawyers to tell them what the law is in the several States concerning loans, and how far the borrowers are liable under the existing statutes. The Glasgow market was, therefore, deemed the place to operate. Most persons here profess to be in the dark. There is always more or less speculation in Scotch warrants by Americans. It is stated, however, that large capitalists have been buying quietly for two months, operating from London and New York, and their idea is to make things hot for the "bears" in Glasgow.—[Iron and Steel Trades Journal, London.

THE COMMERCE OF THE GREAT LAKES.

Few people who live at a distance from the great lakes have an adequate conception of the magnitude of their commerce. It will surprise them, perhaps, to learn that during 234 days of navigation last year tonnage passed through the Detroit river to the amount of 10,000,000 tons more than the entries and clearances of all the seaports in the United States, and 3,000,000 tons more than the combined foreign and coastwise shipping of Liverpool and London. Nor does this include traffic between lakes Superior and Michigan, or lakes Erie and Ontario, or local traffic between ports on these lakes. It may also surprise many to know that nearly three times as many boats yearly pass through the St. Mary's Falls canal at Sault Ste. Marie as pass through the Suez canal, with an aggregate tonnage of 7,221,935 as recorded in 1889, against 6,783,187 for the Suez canal, though with only 234 days of navigation, whereas the Suez canal is open the year round.

Further idea of the importance of our lake commerce may be gained from the figures for lake shipbuilding. Last year the tonnage put afloat by lake builders was almost exactly equal to that of our Atlantic, Gulf and Pacific shipyards combined. To be sure, the lake vessels numbered only 225 out of a total of 994 for the country (exclusive of western river boats), but this very fact shows that on the average the lake builders launched a far better class of vessels. On the lakes were built only four less steamers than on the Atlantic and Gulf coasts, and their tonnage was more than twice as great. Of the whole steam tonnage of the country about a third is on the lakes, and of steamers between 1,000 and 2,500 tons they have more than half the total. Naturally their sailing tonnage is not great, but it is half as large again as that of the Pacific slope. Last year there were 21 sailing vessels of more than 1,000 tons on the lakes, and 156 between 500 and 1,000 tons.

The growth of shipbuilding on the lakes has been very marked in the last few years. In 1886-87 there were 31 boats built, with a valuation of $4,074,000; in 1889-90 there were 56 built, with a valuation of $7,866,000. The tendency here, as everywhere, has been toward iron and steel for big ships. Ten were built of steel in Cleveland in 1888 89. aggregating 22,989 gross tons. One of steel and one of iron were built in Detroit and two of iron in Buffalo. This year has seen Chicago enter the steel shipbuilding field, the keel for her first steel ship being laid July 1, and for the second before the end of that month. Cleveland and Chicago capitalists are largely interested. The material is being brought from Cleveland, but within a year it is expected to use steel plates rolled at South Chicago.

Lake commerce this season has been much confused. Many of the boats have left the grain trade, being driven out, some have charged, by the steamers owned or controlled by railroads. In reply it is asserted that the railroad boats have carried grain at a figure which other crafts could not touch, and that the outside boats left the grain trade because they could make more money carrying ore. But lately the ore traffic also has been unsatisfactory. The mining companies are fast creating or enlarging their own fleets, and there is slight probability of an increase in the total bulk of the ore movement. When to look back to the grain trade, the boat owners find an almost certain diminution of freights. In view of these things the continued activity in shipbuilding is somewhat remarkable. It shows at any rate how sanguine is the western temperament even in the face of ominous facts.—[Bradstreet's.

Clyde Shipbuilding Active.

A correspondent informs us that for some time numerous ship-owners and shipping firm at home and abroad have been in the market for steamers and sailing ships, and there was a general expectation that most of the orders would be placed on the Clyde builders. Much to the satisfaction of firms along the Clyde, these hopes have been filled to some extent. It transpired yesterday that contracts had been concluded with Messrs. Alexander Stephen & Son, Linthouse, for three large vessels for a Glasgow shipping company, and that the same firm have hopes of securing good orders from a Liverpool firm and a shipping company in China. We also understand that a firm at Whiteinch have been favored with an order for a large sailing ship, and have offered for several steamers. The British India Steam Navigation Co. have placed a 5,000-ton steamer with a Dumbarton firm. It is also stated that other builders on the Clyde have received orders to construct four steamers for an Italian company. Those placed with the Linthouse firm will be about 4,000 tons each. It is to be hoped that this activity will spread to the Tyne and Wear, and we should be pleased to hear a little more of shipbuilding on the Thames. Since the launch of the "Blenheim" nothing of any size has been taken in hand.—[Iron and Steel Trades Journal, London.

A WESTERN paper's definition of the term volt: "The volt gives one blow of a specified force. As volts are added together the force of the blow is increased until the endurance limit is reached. It takes about 25 volts to make a perceptible tingling sensation. When 50 volts pass through the body the tingling sensation becomes unmistakable, but not strong, while 100 volts feels lively, 200 volts strong, 300 volts powerful, 400 volts Titanic, and 500 volts will knock a man flat."

THE government of Natal, awake to the importance of establishing new industries, has offered $100,000, it is stated by an exchange, as premiums for the establishment of a score of new industries there.

IRON AND STEEL ROOFING.

Ordinary sheet iron has been used for roofing in Europe for over a century, and practical tests have proven it to be a good roofing. Its use has become more extended as its availability has become better known, and many of the defects alleged against this material have been removed by better workmanship and easier methods of application, both learned from experience. When properly made and laid, iron roofs are found which have lain from twenty to fifty years, without any repairs, only having been preserved by an occasional coating of metallic paint. This roofing possesses some advantages over others by being fire-proof, preventing fire in adjacent buildings from spreading. By diffusing lightning it is also a good lightning-rod. Iron roofing manufacturers claim that such roofing possesses many advantages over other roofs, in that it is heavier, needs fewer joints, is less apt to leak, makes better, stronger and tighter joints or seams, that no solder is used in fastening iron roofs, and that the solder joints in a tin roof are its weakest points, that in a tin roof no allowance is made for expansion and contraction, and consequently the solder gives way, while in an iron roof the joints cannot give way. Also that there is some saving in the wooden sheathing of the roof, much less care having to be taken with the wooden sheathing for iron roofing. Over shingles, it is cheaper and far more durable. Over slate, it is claimed that its advantages are that the original cost of slate is too great, that it cannot stand the heat of fire, and that nails cannot be driven home through it, while slate is not nearly so durable and very much heavier.

In this country sheet iron has been used for roofing about fifty years, and at first all the material used was imported and applied on the system in vogue in Europe, which was very crude and clumsy. The principal device was the wood center, formed square, oval, or, what is now known as the V-crimped. No allowance for expansion and contraction was made, the nails would loosen and draw out, leaks were caused, and sometimes even the roofs became so loose that they would blow off. These crude systems were being constantly improved, and in course of time such glaring defects as the following were obviated: Nailing through the sheets, by introducing metal cleats and standing seams, the construction of the roofing frame, applying ill-adapted roofing, bad material and worse workmanship. In this way much of the more or less deserved prejudice against iron roofing was gradually overcome. Of course this took much patience and a great deal of time and money spent in experiments, advertising and letter-writing. The fact that in the United States there were but eleven iron roofing manufacturers in 1879, against forty-eight now, and in 1871 there were but four, shows that the demand for iron roofing is growing. The sales of iron roofing in 1875 were not over 100,000 squares, while in 1889 there were 1,500,000 squares sold. Another serious obstacle to the more general use of iron roofing was that roofers generally, not knowing much about iron roofing and believing that it menaced their business, opposed it with all their influence and power. They took no interest in it, would not even investigate the claims made for it by the manufacturers, and when compelled to use it by owners of buildings, would not study the directions given for applying it, nor supply themselves with the necessary tools. All this led to bad work, unprofitable results and a wider breach between the manufacturers of iron roofing and roofers; the former then resorted to ignoring the roofer and dealing directly with owners, builders and architects, until finally roofers have found it to their interest to apply any kind of a roof wanted, and to supply themselves with the best information available as to the relative merits of the different makes, as well as the necessary knowledge how to apply and the tools to apply with. The iron roofing manufacturers were ready to meet the roofers half way, because when compelled to deal directly with owners they were put to the disadvantage of having to keep a large number of workmen employed, and send to considerable distances, while when the roofers became willing to apply iron roofing, all this was simplified and became much more profitable. Want of space prevents entering into details, but the points that we wish to emphasize are that iron and steel roofing is made in a large variety of styles, that it possesses many and great advantages, that any roofer can apply it, and that full directions for applying, as well as for measuring and estimating, are furnished by the various companies. Therefore we advise all our readers not to wait until they are called upon to furnish an iron or steel roof, but to take time by the forelock, look over our advertising columns, and send for catalogues and full directions, which will be cheerfully sent by any of the manufacturers.—[Roofer, Tinner and Sheet-Iron Worker.

Concerning the East Tennessee Land Company.

The East Tennessee Land Co. in the death of its President, Gen. Clinton B. Fisk, was thought to have sustained a great loss, on account of the high standing of that gentleman, as it was largely through the influence and business sagacity of Gen. Fisk that the company came before the country in such excellent form. It seems that the moving spirit in the whole enterprise, the one who conceived the splendid project at the outset, and who, in connection with Gen. Fisk, located the valuable lands owned by the company, is Mr. A. A. Hopkins, the Secretary of the company. That both Mr. Hopkins and the East Tennessee Land Co. have a firm hold on the confidence of the best men of the country, is proven by the fact that no less a leading man and financier than Hon. Thomas L. James, ex-Postmaster-General and President of the Lincoln National Bank, of New York City, has accepted the presidency of the East Tennessee Land Co. Few men in the East have the high standing, the business sagacity, as well as wealth and influence, than has Mr. James, and the future of that company is even more than ever assured by the accession of Mr. James as its president. Apropos to this, is the news of the discovery, recently made by the engineer of the company, of a new vein of cannel coal. This makes seven veins of this valuable coal that have been found on the lands of this company since it purchased the land, not one of which were known to exist when the purchases were made. The peculiarity of this last vein, is that it lies between two veins of the best quality of coking coal, the whole deposit being some 5 feet thick. The estimated deposit of cannel coal, in this last vein is some 11,000,000 tons, and the estimate of all cannel coal underlying the lands of this company, is 40,000,000 to 50,000,000 tons. This alone, secures a tremendous value to the lands of the company, not to mention the large iron ore deposits being worked, and known to exist.—[Age of Steel.

A GREAT TRANSANDEAN RAILROAD.

The year 1892 will probably be signalized in South America by a most interesting event in civil engineering and in international overland commerce. This will be nothing less than the completion and opening of the Transandean railroad, forming another railroad line from the Atlantic to the Pacific, and the first across the Continent of South America. It is nineteen years since this work was begun, and it is now confidently expected that it will be finished by the beginning of 1892. The road is to run from Buenos Ayres to Valparaiso, a distance of 871 miles. There are now 640 miles of it finished at the Buenos Ayres end and 82 at the Valparaiso end. Of the remaining 149 miles, about one-third is practically complete, the rails being laid. The passage of the Andes is accomplished at the Cumbre Pass, which is 13,045 feet above the sea level. The railroad, however, does not reach the summit of the Pass, but pierces the mountains by means of a tunnel more than three miles long, at an elevation of 10,450 feet above the sea. This makes it one of the highest, if not the highest railroad, in the world. There is nothing in Europe to compare with it. The St. Gothard railroad is 3 783 feet high, and that on the Rigi only attains an elevation of 5,753 feet. The grades are, of course, very steep. For a considerable distance the rise is more than 422 feet to the mile, or one foot to every twelve and a half. On this portion of the line a rack rail is employed similar to those employed on the Hartz and other mountain roads. The opening of this Transandean railroad will do away with a great deal of the navigation around Cape Horn, which has been the only means of commerce between the east and west coasts of South America. It will also, of course, prove of enormous benefit in other ways to both Chili and the River Platte countries. Especially, it will give the coal and copper and other products of the mines of Chili a splendid market in the Argentine Republic, and it will allow the produce of the fertile farms in the latter country to have better access to the poorly supplied markets on the Pacific coast. And the productiveness of the land in the valley of the river Platte seems to have no limit. The Chilians have very properly been nicknamed the "Yankees of South America." They do, indeed, exhibit the characteristic Yankee thrift and enterprise. But the Argentine Republic has of late years also become much like the United States, especially the Western States. The enormous immigration, amounting to hundreds of thousands annually, gives the people the same cosmopolitan character. The vast plains, devoted to wheat, to fruit growing and to cattle raising, remind one greatly of the prairies and plains of the United States. The opening of direct railroad commerce between the east and west coasts will effect a practical, commercial and industrial union between the nations. Chili will be the New England of South America, the mining and manufacturing region, while the River Platte country will correspond to the Mississippi valley, as the great agricultural country of the continent.—[Kuhlow's German Trade Review.

How to Clean Gummy Machinery.

The simplest and most efficacious method of thoroughly cleaning the various parts of machinery that have become gummed and dirty by the use of fat oils, for lubricating purposes, is by using a strong soda lye. For each 1,000 parts by weight of water take about 10 or 15 parts by weight of caustic soda or 100 parts ordinary soda. Let the solution boil and enter the parts to be cleaned; either boil them in this lye or let them steep in it for some time. All the dirt and oil resin is completely dissolved thereby, and it remains only to rinse and dry the parts. The action of the lye is such that it enters into combination with the oil and forms soap, which is readily soluble in water. In order to prevent the hardening of the lubricant on the machinery parts, it is only necessary to add about one-third kerosene. An occasional lubricating with kerosene alone is to be recommended.—[Glasgow Engineer.

Petroleum as Fuel.

An important apparatus, which has for its object the use of petroleum as fuel for heating boilers on board steamers, has been devised by Mr. De Ferrari, of Genoa, Italy. When crude petroleum is used, the process of combustion occupies a long time, the flame is greasy and moist, and it is impossible to obtain a high heating efficiency and steam pressure. Mr. De Farrari claims to have overcome these difficulties by employing refined petroleum and by using a peculiar kind of "reflectors," which dry the flame and concentrate the heating effect in one part of each of two heating chambers ordinarily used in petroleum-firing tests. The system is now being tried on two Italian steamers, where is said to be more economical than coal.

ON Tuesday, September 23, 1890, the Wheeling & Lake Erie Railway will sell special low rate excursion tickets from all stations to points on the Toledo Ann Arbor & North Michigan Railway, with limit of tickets good for return passage until October 23, 1890. This is the one opportunity of the year for the people of Ohio to visit their Michigan friends at rates so low that the burden of expense will never be realized. Tickets and full information can be obtained from any agent of the Wheeling & Lake Erie Railway.

THE Spanish iron ore trade has been rather quiet of late. The aggregate exports from Bilbao in the first five months of this year amounted, however, to 1,853,208 tons, as compared with 1,692,102 tons in the corresponding period of 1889.

ENERGY AND UTILIZATION OF FUEL.

At the Washington (1890) meeting of the American Institute of Mining Engineers, Mr. W. J. Taylor read a paper on the energy and utilization of fuel, solid, liquid and gaseous. A few opening paragraphs are given herewith: "Nature has furnished us with fuel in three forms: solid, liquid and gaseous —solid, the most common; liquid, containing the greatest energy; gaseous, the most convenient for use. The tendency of the day is to the conversion of solid and liquid fuel into the gaseous form. There is magic in the word gas to many men who, through ignorance or indifference, imagine that by mere conversion into gas an immense quantity of energy can be added to fuel of other forms, forgetful of the law of nature, that the conversion of any substance from one form to another involves a loss of effective energy, and, therefore, that if in certain cases more duty can be obtained out of the gas resulting from a given amount of coal than the coal itself will supply when used direct, the cause lies solely in the more efficient utilization of the fuel in its gaseous state. Nevertheless, new processes for making gas are constantly crowded upon our notice with claims of less cost for manufacture and delivery than natural gas, and often of far more energy for the product than is contained in the coal or oil from which it is made.

"I was recently asked to examine a new process of this kind. From an analysis shown me the calorific energy of the gas approximated 375 heat-units per cubic foot; on ascertaining the quantity of gas claimed to be made from a given amount of solid and liquid fuel, it appeared that for every 325 heat-units contained in the latter, 900 heat-units were alleged to be delivered into the gas, or nearly *three times* as much energy as the original fuel really held.

"The extravagant claim of some oil-gas advocates is still frequently heard, that by vaporizing oil with steam and then passing the mixture through a coil of hot iron pipe, an oil-water-gas containing 26,600 heat-units is formed from one pound of oil carrying originally 21,000 heat-units, while the only energy expended on the gas has been by the introduction of a little steam and a little extraneous heat. Theoretically, one pound of oil converted into water gas carries 26,600 heat-units, but this is only obtainable by a large expenditure of energy, the amount of which is difficult to calculate; even with apparatus of theoretically perfect efficiency, it could not be less than the quantity of heat added to the calorific energy of the oil.

"Again we hear that natural gas has been entirely superseded by a wonderful process of simply superheating steam in the iron pipes and getting pure hydrogen at the exit, oxygen being absorbed or carried off by some unknown and extraordinary means! And within the past year we have had reports of a marvelous grate, burning coal backward, and drawing down the chimney that carries off the products of combustion a wonderful "consuming element," which would evaporate 20 pounds of water with one pound of coal, thus rivaling or surpassing even a famous system of using energy over and over, by which 18 to 20 pounds of water could be evaporated to steam per pound of coal burned. These and kindred impossible schemes are constantly thrust on the investing public, often with success, and in some cases, I believe, without intention of fraud, but through the ignorance of the promoters themselves.

"The cheapest artificial fuel gas per unit of heat is common producer gas, or 'air gas' as it might be termed, since the oxygen for burning carbon to carbon monoxide is derived mainly from air. The associated atmospheric nitrogen dilutes the carbon monoxide, making air gas the weakest of all useful gases, that is, the lowest in combustible, both by weight and by volume. Next in order of heat energy comes water gas, in which the oxygen for combining with carbon to form carbon monoxide is derived from water vapor, and hydrogen is liberated. For equal volumes, this gas has more than double the calorific power of air gas. Third in the ascending scale stands coal gas, the ordinary illuminating gas distilled from bituminous coal, which carries more than double the heat energy of water gas. Last, and highest in the list, comes the gas made in nature's producer, which we cannot duplicate in practice by any known process. The calorific power of natural gas is about 50 per cent. greater than that of coal gas. The introduction of natural gas for metallurgical purposes has largely stimulated the production and use of artificial gas made from coal and from oil, if the vapors of the latter can be fairly considered a gas."

THE PECULIAR DANGERS OF SYNDICATES.

We have observed that it is a comparatively easy matter for a syndicate to carry prices higher and higher when business is active. This was shown to be the case a year or two since, when a boom in the European iron trade commenced. But here a danger presents itself. Prices may be advanced under favorable circumstances, but syndicates always incur the risk of forcing them up to any unduly high point, so that consumption is discouraged and checked and foreign competitors obtain an advantage, which they would not otherwise possess. It is obvious that the influence of any syndicate does not extend very much beyond the immediate field of its operations. For instance, a syndicate may set to work in Germany, and may decree that steel rails are to be sold at so much per ton. But all the German syndicates in the world cannot control or influence the operations of great English metallurgical undertakings. The other day, Bolckow, Vaughan & Co., Limited, obtained an Australian order for steel rails at £5 per ton, and it has been impossible for Belgian and German firms to ignore this transaction; on the contrary, they have been compelled to adjust their rates by it. A slowly moving syndicate may not at once follow suit, but the action of a great metallurgical undertaking like Bolckow, Vaughan & Co., Limited, is too important to pass unnoticed or to be resisted. Similarly, English firms, when they combine in syndicates, cannot afford to overlook what is passing in the great Republic of the United States. The course of transatlantic business is exerting a more or less powerful influence year by year upon European markets, and the puny efforts of a syndicate cannot oppose any effectual resistance to what is passing in America. If there is an active demand for rails in connection with the construction of new American railroads, or the improvement of existing American systems, the European rail trade at once feels the influence of such a favorable state of affairs. If, on the other hand, the American railroad interest shows itself discouraged and enfeebled by dearer money or dwindling traffic, German, French or Belgian syndicates may exert themselves to the utmost to bolster up rail prices, but it will be all in vain.—[Kuhlow's German Trade Review, Berlin.

The Natural Gas Supply Decreasing.

Professor Orton, of Ohio, has again put himself on record regarding the duration of the natural gas supply. In his paper, recently read before the American Association for the Advancement of Science, on "Municipal Corporations and the Natural Gas Supply," he stated that there is not the faintest doubt that the natural gas supply in the Indiana and Ohio fields is not only exhaustible, but is rapidly and surely being exhausted. He said he was yet to find a man conversant with existing facts who does not entirely agree with him. The gas is stored in the rocks, where it has been for untold ages. It is not now being generated, and every foot that escapes to the surface leaves the quantity remaining for future use just so much smaller. The truth of this, Dr. Orton says, is incontrovertibly proven by facts to be easily gathered. The pressure of gas in the wells in the Ohio and Indiana fields is steadily diminishing, the decrease already having amounted to 30 or 40 per cent. In view of this, Dr. Orton urges the imperative necessity for cities and States to take action restricting the lavish and wasteful use of gas. Even the strictest regulations cannot prevent the exhaustion of the supply of gas in a few years, but they may put off that exhaustion some time.—[Light, Heat and Power.

Manganese in Pennsylvania.

Pennsylvania, already containing within her borders more minerals than any other State, has now another one to add to her list. There has been found upon a farm in Caernarvon township, near Morgantown, Berks county, an extensive deposit of manganese in connection with specular or red hematite iron ore. The property belongs to Dr. Heber Plank, of that place. The variety is that known as psilomelane manganese. The find has been kept quiet until now. On April 2d Dr. George A. Koenig, in person, viewed the property and made an analysis of the surface outcrop with a favorable report Since then Dr. Plank, by putting down shafts, says he found a richer looking ore. He sent specimens of his find to Dr. Day, the mineral "sharp" of the geological survey, and that gentleman says that they represent good manganese ores. Dr. Plank is now making negotiations with Carnegie & Co. for the leasing and development of the property. This is the first find of manganese that has ever been made in Pennsylvania and is important for that reason.—[Pittsburgh Dispatch.

Origin of Terne Plates.

"Speaking of terne plates," said Chas. Thuener, a veteran St. Louis tin roofer, to *Stoves and Hardware Reporter*, "I think that they really originated in this country and not in Great Britain, as is popularly supposed. There used to be an old roofer around here who insisted that terne plates were made East more than fifty years ago. I have also seen a published account somewhere of an experiment in Philadelphia with roofing tin, now known as terne, as early as 1830. It was made by hand and by dipping a sheet of bright tin into a bath of molten lead. Some time afterwards the idea of a terne-coated plate was adopted by the Welsh manufacturers, and it was still later that machinery was introduced by them in turning out terne plates. So you see the idea was American, even if carried out by foreign manufacturers. I see the old story of using ternes to make cans is up again. No canner would want heavy coated plates in preference to bright tin. There's nothing in the story, probably; but it comes up every now and then."

The Basic Process in Germany.

Some interesting figures relating to the progress in Germany have been lately compiled by Herr Kintzle, in a paper read before the Aix-la-Chapelle section of the Society of German Engineers. For a series of years the product was as follows, in metric tons:

Year.	Puddled iron.	Total steel.	Basic steel.	Acid steel.
1883	1,517,410	1,060,592	260,000	862,000
1884	1,592,961	1,138,499	.....	.....
1885	1,504,072	1,202,090	406,000	742 000
1886	1,414,611	1,376,356	700,000	676,000
1887	1,624,978	1,738 404	900,000	838,000
1888	1,644,442	1,862,676	1,020,000	842,002
1889	1,650,427	2,046,002	1,203,000	846,000

There are now running in Germany 14 works with 50 converters on basic steel, only three of which partially employ the acid method. Only three steel works, with eight or ten converters, use the acid process exclusively.

Some Big Steel Outputs.

During the night turn on Monday at the Edgar Thompson Works, 81 heats were made in 12 hours, the converting mill turning out 850 tons of steel. Seventy-three heats were made in the blooming mill, and the rail mill turned out 2,500 rails.

The Alleghny Bessemer Steel Works, at Duquesne, turned out 16,348 tons of rails, 20,000 tons from the converting mill, and 17,000 tons of blooms during the last month —[Pittsburgh Dispatch, Sept. 3.

As a sequel to advertising liberally, the Egan Co., of Cincinnati, O., the well-known builders of wood-working machinery, report heavy sales to Australia, New Zealand, Finland, Russia, Norway, Sweden, Germany, France and England. Their home trade is now larger than ever before, and is steadily on the increase. This great company is known for the doses of push they put into their business efforts in reaching out for trade.

INDUSTRIAL SUMMARY.

New Enterprises:—

The Tiffany Iron Works, at Tecumseh, Mich., has been incorporated with a capital of $50,000.

The Loudonvillle Machine Co. has been incorporated at Loudonville, O., with a capital stock of $2,000.

The Diamond Iron Mining & Manufacturing Co., at Negaunee, Mich., has been chartered; capital $100,000.

It is said the American Fire-Proof Steel Car Co. will locate in the town of Bloom, Ill., near the Indiana line.

The manufacturing industries of Bristol, Conn., will be increased by the addition of the Turner Heating Co., of Meriden, Conn.

F. H. West is reported as organizing a stock company in Milwaukee, Wis., to establish a plumbers' hardware factory in Birmingham, Ala.

The North Chattanooga Manufacturing Co. will, it is reported, erect works for the manufacture of mill machinery in North Chattanooga, Tenn.

Iron pipe works, a nail factory, passenger and electric car works, a foundry and machine shop are reported as to be established at Goshen Bridge, Va.

The National Railway Forging Machine Co. has been incorporated at Covington, Ky., to manufacture railroad forgings. The capital stock is $200,000.

The Edison Industrial Works have been incorporated, with a capital stock of $1,000,000, of which $550,000 is preferred. The company will operate near Bloomfield, N. J.

Carl Jenson, Reed Williams and others have purchased the old bolt and nut factory, and will establish a plow and agricultural implement factory, at Birmingham, Ala.

A new industry, to be known as the Nashua Lock & Hardware Co., will soon begin operations in Nashua, N. H. The organization has just been completed, and is capitalized at $20,000.

The Collins Automatic Car-Coupler Co. has been organized at Farmville, Va., with W. G. Dunnington, President, and J. R. Martin, Secretary, for the purpose of manufacturing the Collins automatic car-coupler.

The Cumberland Lands, limited, is the name of the company incorporated in London, Eng., and purchasing the Cumberland Iron Works property, at Dover. It proposes developing the mineral resources, building furnaces, rolling mills, etc. The capital stock is $1,250,000. M. T. Scott, of Bloomington, Ill., can give particulars.

The Salem Car & Machine Co. has just been organized at Salem, Va, by capitalists from New York, Boston, Maine and New Hampshire. The authorized capital is $500,000. Work on the new plant will begin as soon as the formation details are completed. J. W. Allemong is President, and W. U. B. Stinson, of Concord, N. H., Vice-President.

The John W. Sargent Manufacturing Co. has been organized at Aurora, Ind.,to manufacture the John W. Sargent patent combined vise and drill. H. P. Spaeth, of Aurora, Ind., is President; George Frank, Vice-President; Alex. B. Patterson, Treasurer; John N. Sargent, Superintendent, and E. A. Schumacher, of Cincinnati, General Manager. The cash capital of the new concern is $10,000.

The Kanawha Bicycle Co. has been incorporated at Charleston, W. Va., with a capital stock of $50,000, to manufacture bicycles, tricycles, velocipedes, etc. The officers of the company are: President, Jacob Jelenco; Vice-President, Frank Woodman; Secretary, W. T. McClurg; Treasurer, Moses Frankenberger. A. J. Gould, who proposed the new concern in Charleston, was made General Manager, is making some special machinery, and it is expected that the works will be running by November 1.

The Dominion Iron & Steel Co. has been incorporated at St. John, N. B., with a capital stock of $500,000. The company is formed for the purpose of erecting and operating mills for the manufacture of rolled and hammered iron, bar iron, cut nails and spikes, horseshoes, railroad and other spikes, fish plates, polished shafting and other articles. The plant is to be built in the vicinity of the city of St. John, on the Bay of Fundy, accessible by vessel and adjacent to lines of railway that connect with all points east and west. The building will contain four train rolls, ten furnaces, nail and spike factory with 50 machines, a horseshoe machine, with a general machine shop and shafting department.

The following new companies have been granted licenses of incorporation by the Secretary of State of Illinois: Chicago Ornamental Iron Co., Chicago; to manufacture ornamental iron bars; capital, $15,000; incorporators, Henry J. Frost, John Scollman, John Meyer.—Honrahan Automatic Refrigerator Car Co., Chicago; to build and equip refrigerator cars; capital, $500,000; incorporators, William A. Laidlaw, Charles B. Moore, Lorenzo C. Brooks.—Standard Matrix Machine Co., East St. Louis; to manufacture machines for forming matrixes; capital, $1,000,000; incorporators, A. J. Kletzker, H. H. Wernse, George Keller.—Fuller & Warren Warming & Ventilating Co., Chicago; to manufacture warming and ventilating apparatus; capital, $50,000; incorporators, Andrew F. Burnett, Frederick Hawkins and Jesse L. Potter.—Illinois Sears Matrix Machine Co., Chicago; to manufacture Sears matrix machines; capital, $300,000; incorporators, O. H. Mann, Henry J. Suhr, C. L. Graham.—Freeport Bicycle Manufacturing Co., Freeport; to manufacture bicycles; capital $25,000; incorporators, W. O. Wright, W. Wagner and others.

Enlargements, Additions, Removals, Etc.:—

The Moline Plow Co., at Moline, Ill.. are putting up a large addition.

The Diamond Slate Iron Co., at Wilmington, Del., are building a large new foundry.

The Batesville Iron Works, Batesville, Ala., will add a foundry to its machine shops.

The boiler works of Rarig & Nichols, at Columbus, O., will be removed to Buena Vista, Va., and it is expected that the new plant will be in operation by January 1, 1891.

The Cherokee Iron Manufacturing Co. purposes to erect a 50-ton charcoa furnace near New Birmingham.

W. S. & A. C. Whitman, of Columbus, O, manufacturers of stoves and ranges, will move to Glasgow, Va.

J. F. Byers, manufacturers of the Byers hoisting engine, is building a machine shop and foundry, at Ravenna, O.

The Columbia Iron Co., at Lancaster, Pa., are putting in an additional heating furnace and a double puddling furnace.

The Cummings Iron Works, at Hammond, Ind, have been purchased by a syndicate, who, it is said, will increase the plant and employ 500 hands.

Armstrong Bros., Springfield, O, have put in a 12′ set of boiler rolls, and a No. 2 Hilles & Jones punch, also a 60″ swing by 24″ engine lathe and radial drill press.

The Washburn & Moen Manufacturing Co., of Worcester, Mass., have increased their capital stock from $1,500,000 to $2,000,000, by the issue of 5,000 shares. It is reported that rights are selling at 21.

It is reported that the Sterling Emery Wheel Co., of West Sterling, Mass., has decided to remove its present factory to Tiffin, O., where it will occupy a building 200x60 feet. Natural gas will be used as fuel.

The Empire Plow Manufacturing Co., formerly of Pittsburgh, Pa., have removed to Cleveland. They have purchased the plant of the Forest City Malleable Iron Co., on Tod street, and expect to begin operations next week. They will have excellent railroad facilities, and will employ about 600 men.

Some time ago *The Iron Trade Review* stated that the McDermitt Tool Works, of Martins Ferry, O., has commenced the manufacture of oil well supplies. The concern has met with so much prosperity that it has been compelled to put in a new steam boiler and engine, two steam hammers, besides otherwise improving the facilities.

The Van Duzen Gas & Gasoline Engine Co. have within a few weeks removed from the corner of Broadway and Seneca streets, to No. 25 Broadway, Cincinnati, O. In their location they are better prepared than ever with more room and increased facilities to fill orders. Their business during the year shows an increase over that of previous years. They will be pleased to meet all persons needing any of their engines.

Furnaces and Works Starting Up:—

The Scranton Steel Co., at Scranton Pa., have again started up.

The gray iron foundry of Warder, Bushnell & Co., at Springfield, Mass., has started up. The malleable iron foundry has been running for some time.

The Citico Furnace, at Chattanooga, Tenn., has blown in again.

The Cherry Valley Furnace, of the Cherry Valley (O.) Iron Works, started up on the 17th ult., having been relined and other improvements made to it.

The blast furnace of the Bentwood Iron Works, at Martin's Ferry, O., which has been undergoing a relining and general repairing, was blown in this week and a long and successful run is anticipated.

Fires and Accidents:—

The works of the Western Steel Scraper Co., at Mount Pleasant, Ia., were partially destroyed by fire on the 19th ult.

General Industrial Notes:—

The Fort Payne Rolling Mill Co., Fort Payne, Ala., has just turned out the first steel nails ever manufactured in the South by the Gleason nail machine.

W. F. Mattes, general manager of the West Superior Iron & Steel Co., of Superior, Wis., states that contracts are soon to be placed for a large plate train and reversing engines.

The first steel steamboat ever constracted in New Jersey was launched at Elizabethport on the 28th ult. Samuel L. Moore & Sons are the builders. The steamer is built for residents of Mexico. The dimensions of the craft are 65 feet long, 15 feet beam and 6½ feet hold.

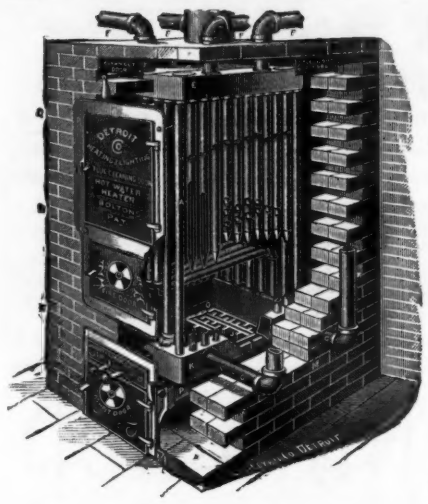
The American Wire Nail Co., of Covington, Ky., manufacturers of wire rods, wire and wire nails, were established in 1875, and incorporated in 1876, and have been doing a growing business from year to year. This company have a factory in the same line of business in Anderson, Ind.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock, P. M, on the 30th day of September, 1890, for all the labor and materials and putting in place complete the iron columns, iron floor and iron and wood roof construction, terra cotta arches, etc., for the U. S. Custom House, Post Office, etc., building at Port Townsend, Washington.

The Spalding Iron Works, at Brilliant, O., were finally sold at sheriff sale last week for $60,000. The purchasers were: George K. Wheat, Joseph Speidel, Alex Updegraff, Morris Horkheimer, Andrew U. Wilson, William F. Stifel, William B. Simpson, Henry M. Russell, Robert Simpson, George W. Eckhart, Jr., and Thomas O'Brien, all of Wheeling, W. Va. The property includes twenty acres of ground, five hundred acres of coal, and a well-equipped nail factory and puddle mill. This is the third time the porperty has been offered for sale, the appraisment having been too high to allow it to be sold at a price that any one could give.

It has only been in recent experience that a forge could be built and operated in this country equal to the manufacture of the heaviest kinds of machinery. The Cleveland City Forge & Iron Co. is equal to this task, and it is said to be, outside of the Krupp manufactory in Germany, the largest of its kind in the world. It has a trip hammer with the gentle name of "Tom Coe." It can strike a blow equaling 3,000 tons, and has a capacity of forging a piece of iron weighing 150 tons. The bed on which this hammer rests consists of solid masonry, and is imbedded 65 feet in the ground. The block on which it makes its gentle taps weighs just 100 tons. It is handled by machinery and

BOLTON



Best for Warming Dwellings, Greenhouses, Schools, &c.
Most Economical, Durable and Easily Managed.

HOT-WATER HEATER

Safe. Clean.

BEST RECORD IN CANADA AND THE BLIZZARD NORTHWEST.

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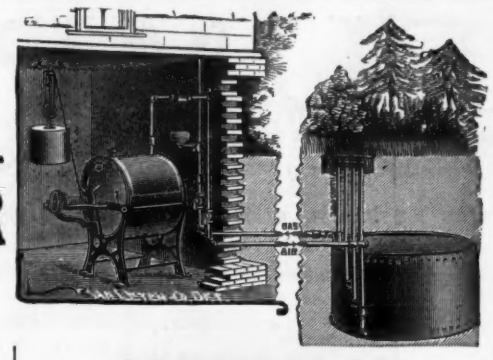

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The Meriden Malleable Iron Co., Meriden, Conn., manufacturers of kerosene fixtures, lamps, cabinet hardware, brackets, cork pullers, etc., write us that although it is less than three months since they introduced the first sample of their Rapid cork puller, it is meeting with a very active demand. It is something new in the line of cork pullers, being smaller, therefore occupying less room; is very simple and so arranged that the strain comes on the strongest part of the bottle. It will cut the wires and pull the cork with one motion of the hand. Another important feature is that any part can be replaced without returning the entire machine to the factory.

The W. F. & John Barnes Co., sole manufacturers of Barnes' patent foot and steam power machinery, Rockford, Ill., say that their business is very good, indeed, and the outlook for Fall trade quite promising. The have just shipped a car load of machinery to San Francisco and will ship another car load to Boston the first of next week. Their export trade is also increasing in a most satisfactory manner, their English agents in particular meeting with very gratifying success. They recently made a single shipment to their people in London of nearly a car load of machinery, and have another large order from them in hand.

Some weeks ago we published an item calling attention to the I. K. L. drawing stand, the invention of and made by Jones & Mack, Cincinnati, O. In this item was mentioned the number of tables sold, nine being in use in one architect's office in Cincinnati. They have lately removed from 119 West 5th street to their handsome new offices in the Smith building, No. 220 Walnut street, Cincinnati, O. This firm makes a specialty of the designing of special machinery and machine tools, and have recently finished some wire making machinery, a radial drill and milling machine and have on hand at the present time a large universal milling machine, two lathes and numerous small jobs. They also make a business of examining machines and making reports for buyers and others interested and making drawings and blueprints.

THE annual meeting of the Army of the Cumberland will be held in Toledo, O., September 17, 18 and 19, 1890, on which occasion the Wheeling & Lake Erie Railway will sell excursion tickets at one fare for the round trip from all stations, September 16, 17 and 18, with limit for return passage including September 20th, 1890. This will be one of the largest and most interesting meeting of army organizations, this year, outside of the G. A. R. National Encampment, and rates have been made within the reach of all desiring to participate. At last year's meeting the attendance reached nearly 15,000.

SEVERAL Pittsburg iron firms are said to contemplate introducing artificial fuel gas furnaces on account of the 25 per cent. advance in natural gas.

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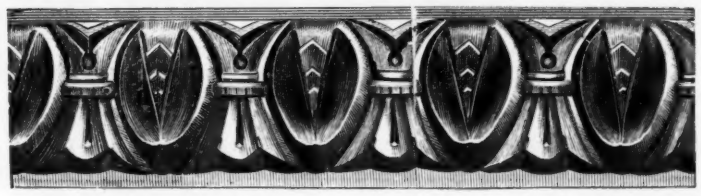

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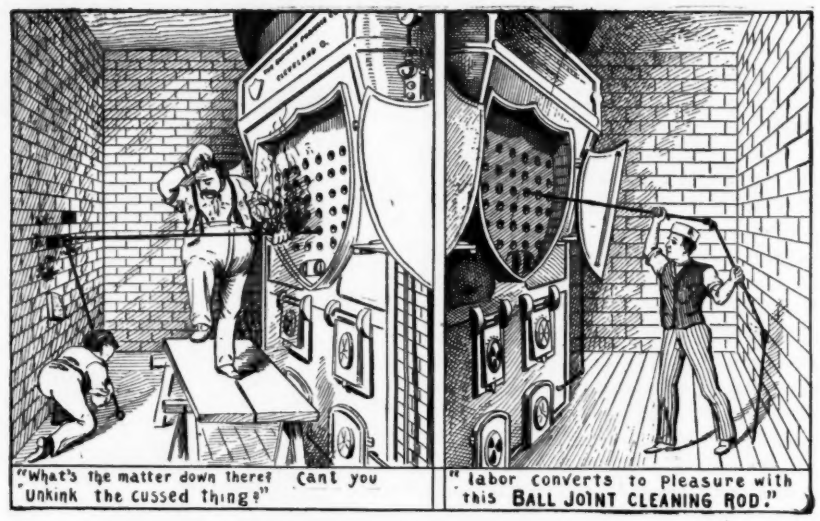
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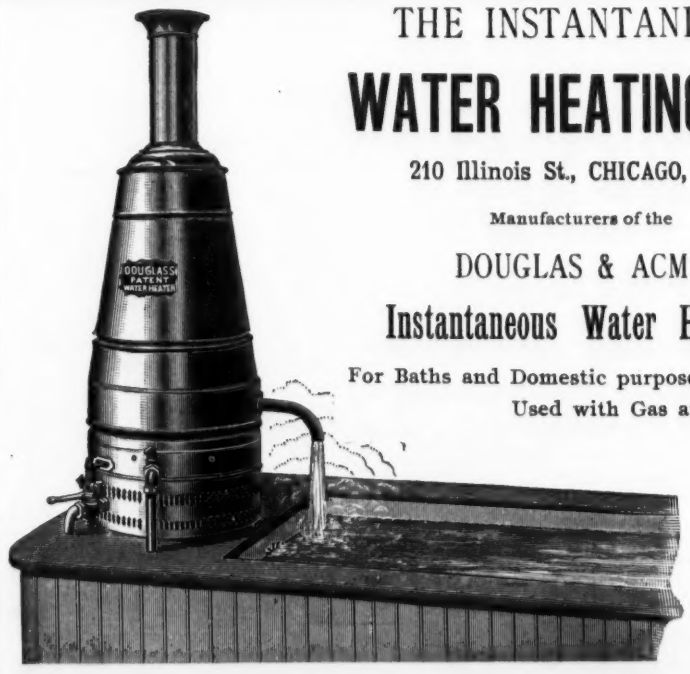

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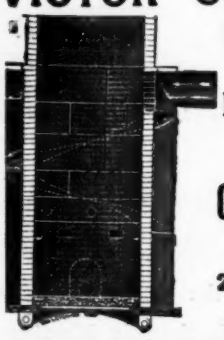

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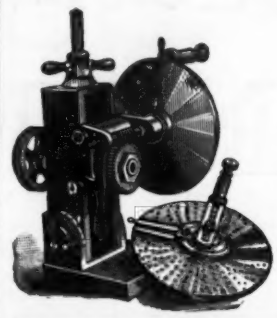

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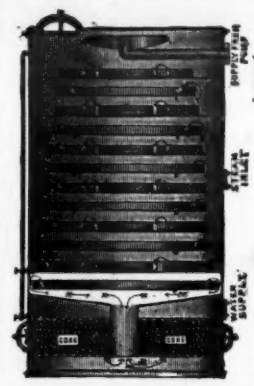

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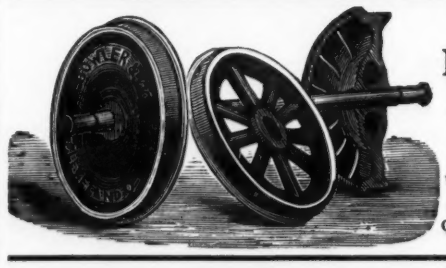

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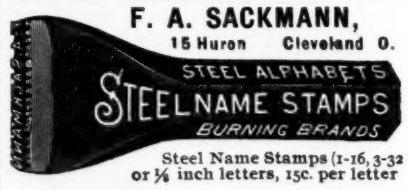

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1 to 1⅜ by ¼ and 5-16 inch	2 25
½ to ⅝ by ¼ and 5-16 inch	2 45
⅝ to ⅝ by ¼ and 5-16 inch	2 95

Hoops.

1¼ to 4, Nos. 13 to 15	2 75
1¼ to 2, Nos. 16 to 18	2 85
1¼ to 2, No. 19	2 95
1¼ to 2, No. 20	3 05
1¼ to 2, No. 21	3 15
1¼ to 2, No. 22	3 25
15-16, 1 and 1⅛, Nos. 13 to 15	2 95
15-16, 1 and 1⅛, Nos. 16 to 18	3 05
15-16, 1 and 1⅛, Nos. 19 and 20	3 15
15-16, 1 and 1⅛, No. 21	3 25
15-16, 1 and 1⅛, No. 22	3 35
⅞, Nos. 13 to 15	3 15
⅞, Nos. 16 to 18	3 25
⅞, Nos. 19 and 20	3 35
⅞, No. 21	3 45
⅞, No. 22	3 55
13-16, Nos. 13 to 15	3 35
13-16, Nos. 16 to 18	3 45
13-16, Nos. 19 and 20	3 55
13-16, No. 21	3 65
13-16, No. 22	3 75
¾, Nos. 13 to 15	3 45
¾, Nos. 16 to 18	3 65
¾, Nos. 19 and 20	3 75
¾, No. 21	3 85
¾, No. 22	3 95
11-16, Nos. 13 to 15	3 65
11-16, Nos. 16 to 18	3 85
11-16, Nos. 19 and 20	3 95
11-16, No. 21	4 05
11-16, No. 22	4 15
⅝, Nos. 13 to 15	3 95
⅝, Nos. 16 to 18	4 15
⅝, Nos. 19 and 20	4 25
⅝, No. 21	4 35
⅝, No. 22	4 45
⅝, No. 23	4 65

Light Band.

1¾ to 6 by ¼ to 3-16 in	2 35
1¾ to 6 by Nos. 11 and 12	2 45
1 to 1¾ by ¼ to 3-16 in	2 55
1 to 1¾ by Nos. 11 and 12	2 65
⅞ and 13-16 by ¼ to 3-16 in	2 85
⅞ and 1 3-16 by Nos. 11 and 12	2 95
¾ and 11-16 by ¼ to 3-16 in	3 15
¾ and 11-16 by Nos. 11 and 12	3 25
⅝ and 9-16 by ¼ to 3-16 in	3 45
⅝ and 9-16 by Nos. 11 and 12	3 55
½ by ¾ to 3-16 in	3 75
½ by Nos. 11 and 12	3 85

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 95
⅞ inch, " " " 13 and 14	3 15
¾ inch, " " " 11 and 12	3 25
¾ inch, " " " 13 and 14	3 45

Sheet Iron.

No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c ℔ extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1⅛c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅜ and 2⅜ to 3 in	10¼
3⅛ to 4 in	11
⅜ to 11-16 and 4⅛	10¼
⅜ to 6 in	11⅛
¼ to 9-32 and 6⅛ to 7 in	12
5-6 in	14

Flats.

	cts. ℔s
2 to 9-16 wide by 2 to ⅛ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	3 00
Tire	"	3 00
Spring	"	3 50
Sleigh Shoe	"	3 00
Toe Calk	"	3 25
Cutter Shoes, tapered and burr.	"	3 25

English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
" "Choice"	36c

Burden Boiler Rivets.

⅛, ⅝, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ⅝, 11-16 and ¾ inch diam	4 00

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	NET TONS
No. 1 R. R. wrought scrap	$19 50
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	13 50
Iron axles	22 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	9 00
Uncut wrought iron boilers	13 00
Steel boiler plates	17 00
Grate Bars	9 00
Pipes and flues (Clean)	13 00
Tank iron	13 00
Hoop and band iron	9 00
Sheet iron	10 00
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

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SHEET IRON.
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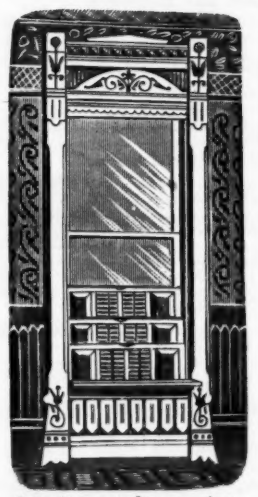

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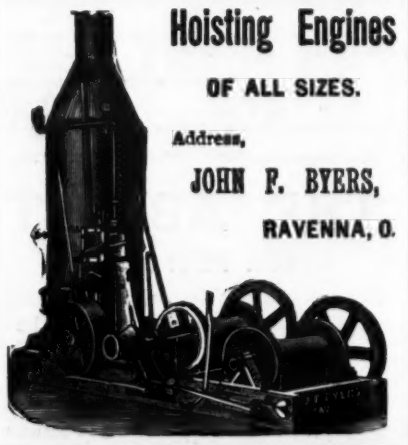

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American.....₩ lb 9@10
Wrights.....₩ lb 9¾

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shultz Raw Hide Leather Belting, single,.....dis 40
Shultz Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¾@10¾

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12¾ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill .....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3¼

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills .....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2¾c
½ kegs ₩ lb	4¼c	5¼c		2¾c
¼ kegs ₩ lb	4⅜c	5⅜c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7¼c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@55&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¾	4	3½	3⅛
Hexagon	15⅛	11¾	8¼	6	5¼	5¼	5
Washers	9	8	7	5	4½	4¼	4⅛

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 70@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12@24
Wreelsior Rubber.....₩ lb 24

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17,.....dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15¾
Sisal, ¼ inch and over .....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

Wire.

New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 30

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

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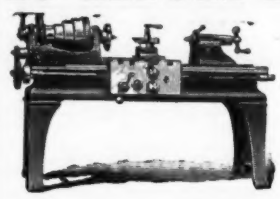

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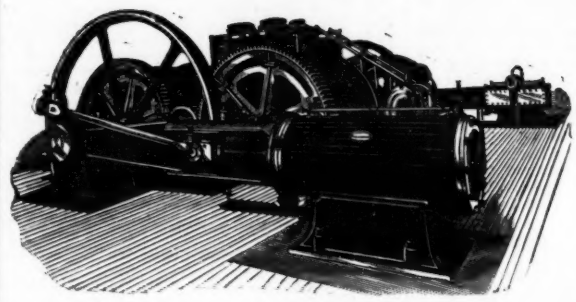

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Common augers and bits.....dis 70
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Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $8 00
Others.....℔ doz $7 00
Full polished.....℔ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7½
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 70&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 70&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 70&5
Wrought, loose joint, broad.....dis 70&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 70&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 70&5

Chains.

	Revised List.
Trace, 6¼-10-2.....℔ pair 1.03	
Trace, 6¼-10-3.....℔ pair .92	50&10
Trace, 7-10-2.....℔ pair 1.11	
German Halter Chain, list June, 1887	dis 50&10
German Coil, list of June, 1887	dis 50&10@60
Galvanized Pump Chain	℔ 05¼@06
Jack Chain, Iron	dis 75@75&5
Jack Chain, Brass	dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	...	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Jars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11¼ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 50&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

No.	10	9	8	7	6	
Ausable, ℔ M.	23	24	25	26	28	dis 25&10
Putnam, ℔ M.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbear, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 66⅔
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs. genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze...dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$6...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

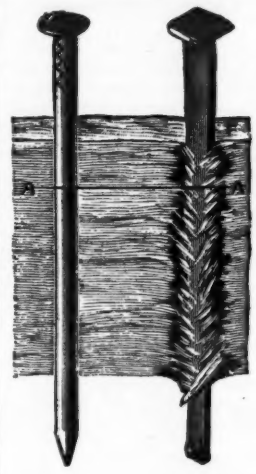
Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ dos $18 dis 25

Squares.

Steel and iron, Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.
American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
Cut edges iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 65
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10



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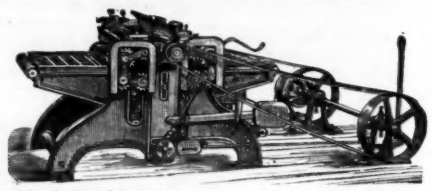

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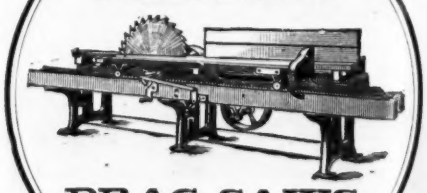

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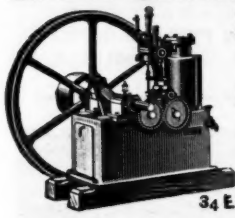

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	Arrive.	Depart.
N. Y. & Pitts. Express.....	‡5 35 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.

(Standard Gauge.)

Depart for—

Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

Trains marked * run daily.

Valley Railway.

FOR AKRON, CANTON AND MARIETTA.

Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 45 a m	*6 25 p m
Marietta Express.....	†11 15 a m	†2 25 p m
Valley Junction Express...	*4 15 p m	*10 25 a m
Cleve. and Canton Express	*7 05 p m	†8 20 a m

*Daily. †Daily, except Sunday.

J. T. JOHNSON, Gen. Supt. J. B. CAVEN, Gen. Pass. Agt.

From Cleveland Union Station.

PENNSYLVANIA LINES.

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. * Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus. Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls. Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
	3 25 p m	10 10 a m

d Daily. Other trains except Sunday.

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No. 72, New York & Pitts. Express....	* 8 10 a m
No. 70, Pittsburgh Accom.....	*11 25 a m
No. 64, New York & Pitts. Limited...	* 2 50 p m
No. 66, Mantua Accommo.....	* 4 20 p m
No. 74, Youngst'n Ex.....	† 6 00 p m
No. 68, New York & Pitts. Ex.....	*11 00 p m
	Arrive.
No. 61, N. Y. & Pittsburgh Express...	† 5 15 a m
No. 71, Youngstown Accom.....	* 7 15 a m
No. 65, New York & Pitts. Lim.....	* 9 55 a m
No. 67, Pittsburgh Accom.....	*12 45 p m
No. 73, Leavitssburgh Local.....	* 2 10 p m
No. 63, New York & Pitts. Ex.....	* 6 50 p m
No. 75, Mantua Accom.....	* 7 20 p m
No. 69, Youngstown Express.....	† 9 10 p m

*Daily. †Daily, except Sunday.

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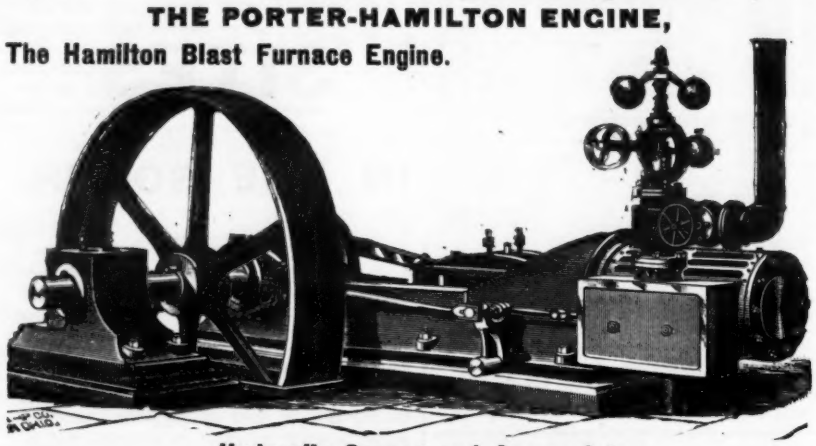

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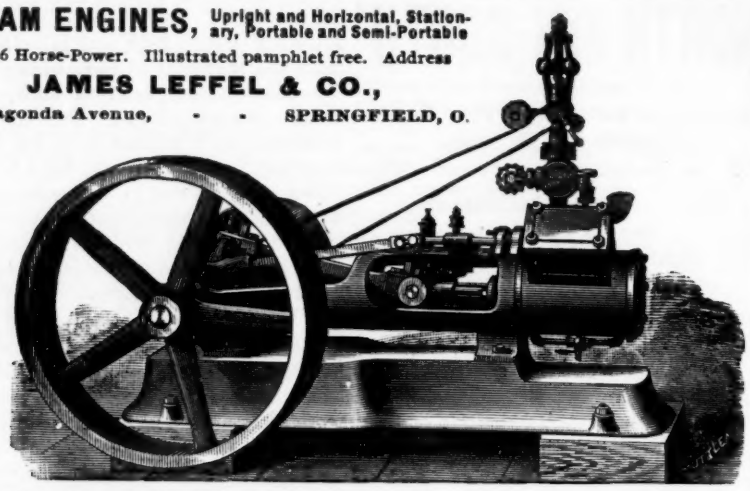

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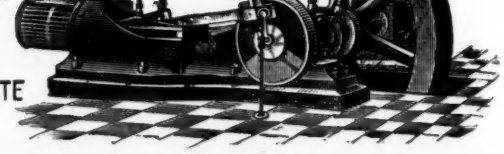

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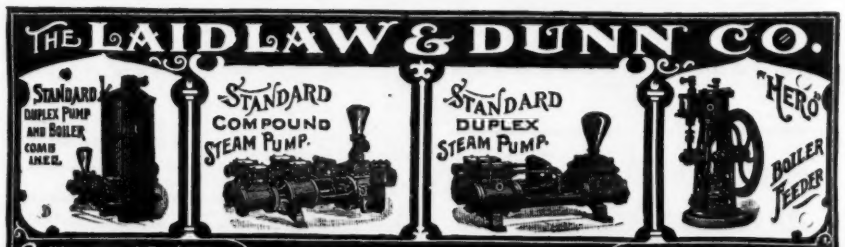

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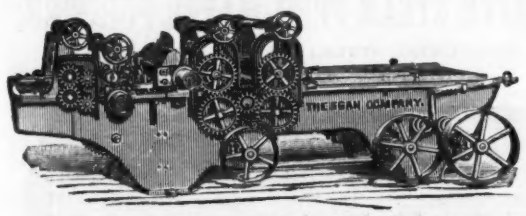

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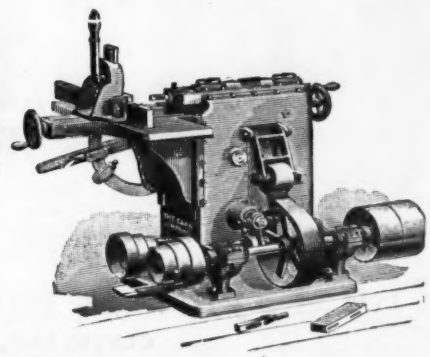

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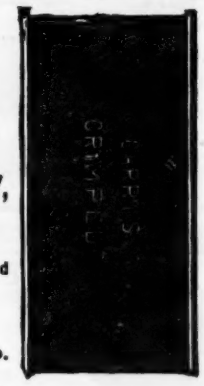

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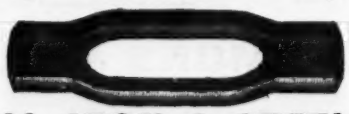

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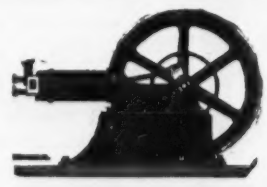

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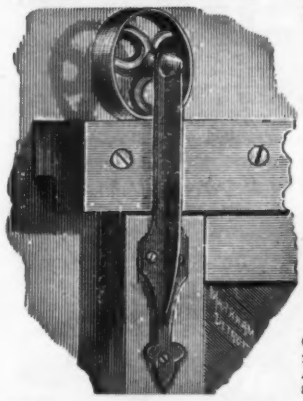

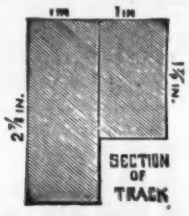

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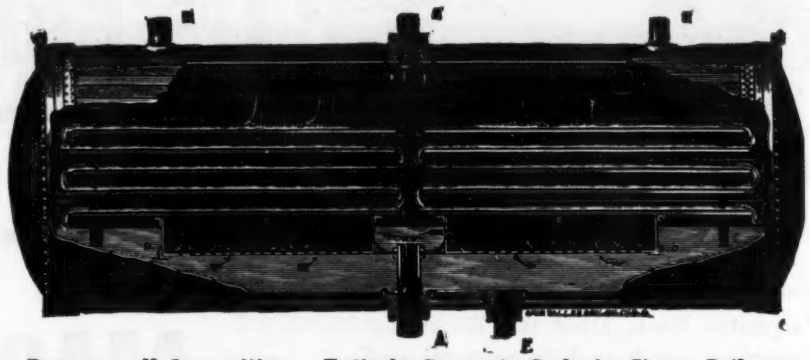

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